September
1960

COMMERCIAL FERTILIZER

and PLANT FOOD INDUSTRY

NEW WAY to produce fertilizer containing nitrate, ammonia and water-insoluble organic nitrogen with ONE ammoniating solution.

SEE PAGE 19

Advertisement of Nitrogen Division, Allied Chemical Corporation

sleek...
trim...
and perfectly coordinated!

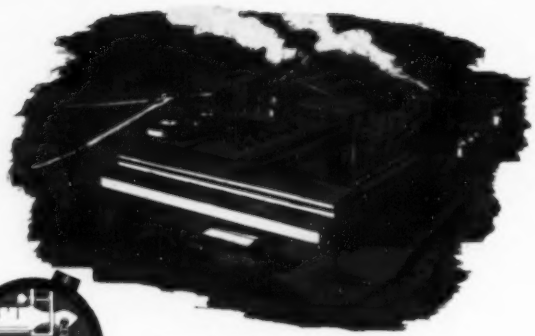
That's our new 300,000 sq. ft. multiwall bag plant at St. Marys, Ga.

Like the building itself, our equipment is new and the very latest in mechanical efficiency.

This fully integrated plant has every facility for turning out every kind of multiwall bag ... open mouth or valve, sewn or pasted, stepped-end, and our own patented Kraft-lok® valve; also bags with special inserts, sleeves, protective linings or outers, and vapor barriers.

The best in multiwall bags—are Kraft Bags!

... and the best in open mouth bag filling machines is The Kraftpacker, for which we are exclusive sales agents.



Paper Mill at St. Marys, Ga.

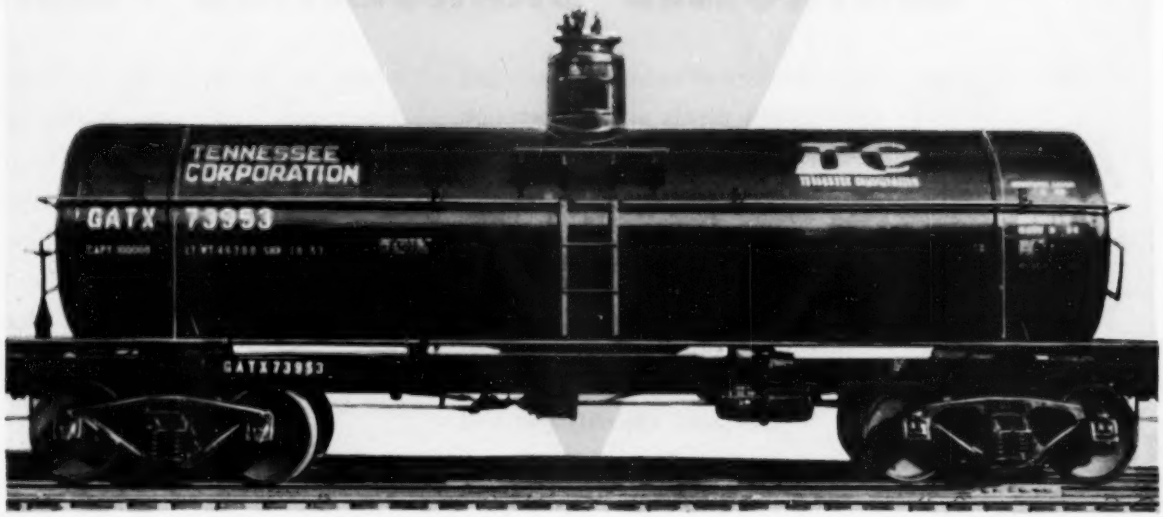
KRAFT BAG CORPORATION
Gilman Paper Company Subsidiary
630 Fifth Avenue, New York 20, N. Y.
Daily News Building, Chicago 6, Ill.

☐ We would like to know more about Kraft Bag Multiwalls.
☐ We would like to know more about The Kraftpacker.

COMPANY NAME_____
ADDRESS_____
CITY_____ ZONE____ STATE_____
PRINCIPAL_____
PRODUCT MFD_____

CF

SULFURIC ACID



A BASIC PRODUCER FROM MINE TO FINISHED PRODUCT

The Sulfur contained in the ore we process yields Virgin Sulfuric Acid of highest quality – We produce all grades and strengths of Sulfuric Acid from 60° Baume through the various Oleums.

For complete listing of our products see our inserts
in CHEMICAL WEEK BUYERS' GUIDE, Pages 173-176
or CHEMICAL MATERIALS CATALOG, Pages 551-554.

TC
TENNESSEE CORPORATION

TENNESSEE CORPORATION
612-629 GRANT BUILDING, ATLANTA 3, GEORGIA

ANY WEATHERLY

CONTROLLED GRANULATION PLANT

Several dozen Weatherly Controlled Granulation plants are in operation in the South and Midwest. Weatherly controls are so sensible you could take a hand from any one of them, move him to any other—and he could operate the controls for you.

Before we turn the plant over to you, it is running smoothly, it is running at designed capacity—and it is being operated by your people . . . *and they know how, beyond question.*

"Controlled granulation" means control all the way, including complete uniformity of granules, through 6 and on 16 mesh screen. This is guaranteed. So is the production rate.

Weatherly construction means getting it done on time. It means Weatherly-designed equipment that is meant to do its job for many years, under pressure. Weatherly design means you get a premium product from low-cost materials.

Weatherly plants help make good profits for their owners. Perhaps you would like to be one of these.

If so, it won't cost you a penny to talk to us about it.

OUR PLANTS PURR LIKE KITTENS

The D. M. WEATHERLY COMPANY

Industrial Engineers and Builders

80 Eleventh St., N.E., Atlanta, Georgia Phone: TRinity 5-7986

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COMMERCIAL FERTILIZER

and PLANT FOOD INDUSTRY

Vol. 101, No. 3 September, 1960

Established 1910

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✦

COMMENTING FREELY

by
Bruce Moran

Youngsters and oldsters in the industry seemed to get a kick out of the old-time features in our 50th Anniversary issue of last month. We got a kick out of it ourselves — poring through the old bound copies dating back to 1910: the old pictures, the ancient statistics, the evidence throughout of an industry just waking to some idea of its real potential.

Not that our industry has realized its potential. We have a long, long way to go before the average American farmer uses all the plant food his land can profitably absorb. And in the international scene the distance to taw is even greater. But we are well on our way to the acceptance and application our plant food deserves.

We hope those editors who do the Centennial Issue can look back at 1960 and smile at the small size of the industry—in comparison with what we are sure it will be in the year 2010. We believe they will.

Thanks for your letters. Your praise is gratefully acknowledged by our entire staff.

Boss of a "*Penny-Pinching Brain*"

He heads up the Phillips *66* Electronic Computer Service that is proving so effective in working out "penny-pinching" fertilizer formulations for Phillips *66* mixer customers. Although the savings may be only pennies per ton, they can run into thousands of dollars a year.

For example, using the electronic "brain" resulted in a sizable profit increase for one fertilizer manufacturer. He supplied Phillips with an analysis of his materials, the grades of fertilizer and amounts of each he wished to make. The production schedule and formulations figured out by the Electronic Computer saved him from 30 cents to $1.50 per ton on material costs. The net saving during the year came to almost $15,000.

Computing formulations is not the only way Phillips can serve you. Phillips advertising and sales aids promote farmer-dealer cooperation and increased use of mixed fertilizers. Phillips will also help in sales and industry meetings for your salesmen and dealers . . . provide skilled technical assistance . . . and, of course, give you dependable delivery on high quality Nitrogen solutions, Anhydrous Ammonia, Ammonium Nitrate, Ammonium Sulfate, and Triple Superphosphate. If you have a formulation problem, call or write the nearest office listed below.

"Good name to grow by"

PHILLIPS 66

PHILLIPS PETROLEUM COMPANY, *Bartlesville, Oklahoma*

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ST. LOUIS, MO.—*4251 Lindell Blvd.*
TAMPA, FLA.—*3737 Neptune St.*
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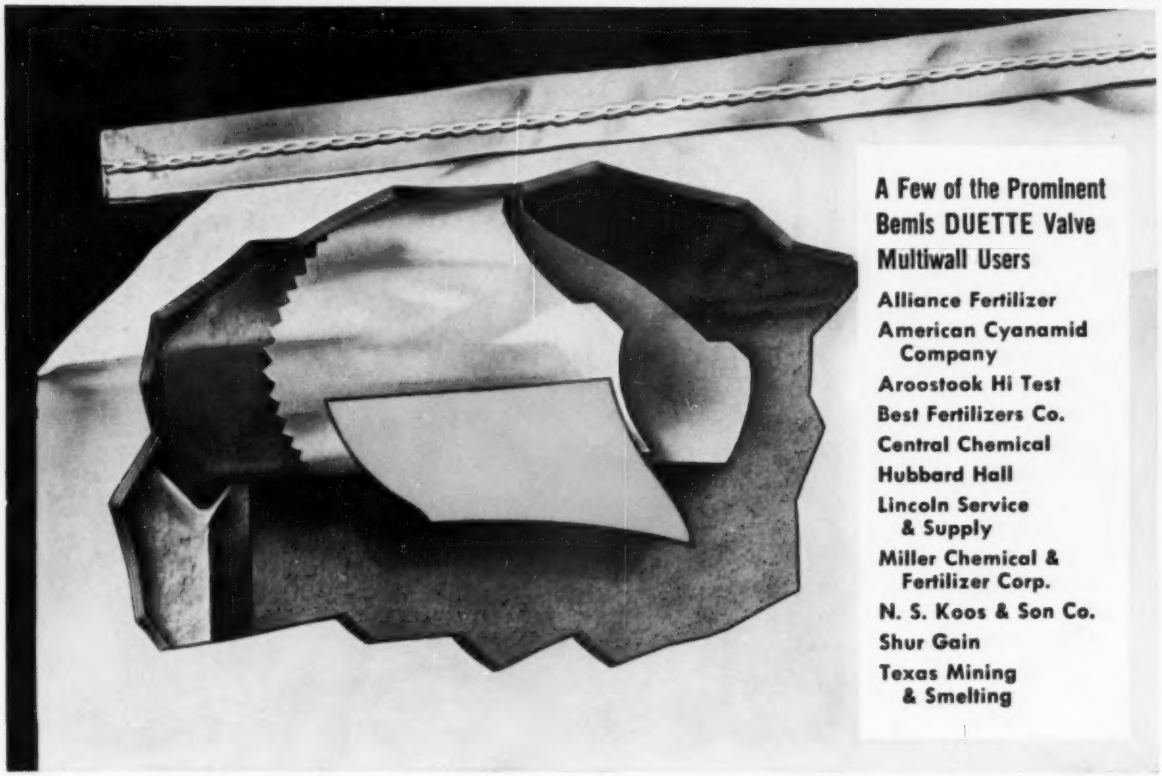
WICHITA, KAN.—*501 KFH Building*

Bemis *Duette*® Sewn Multiwall Sleeve Valves Have Been Experience-Proved

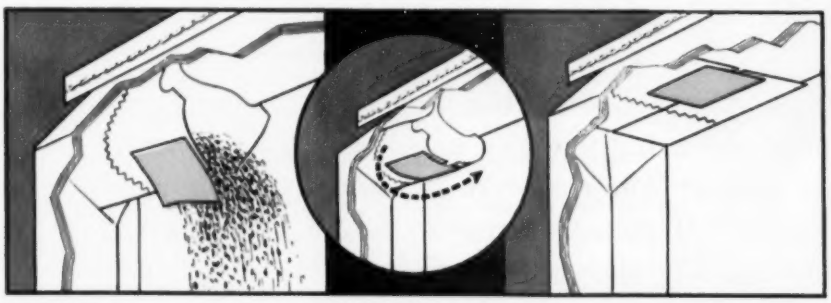


A Few of the Prominent Bemis DUETTE Valve Multiwall Users

- Alliance Fertilizer
- American Cyanamid Company
- Aroostook Hi Test
- Best Fertilizers Co.
- Central Chemical
- Hubbard Hall
- Lincoln Service & Supply
- Miller Chemical & Fertilizer Corp.
- N. S. Koos & Son Co.
- Shur Gain
- Texas Mining & Smelting

It's been more than three years since Bemis perfected the DUETTE, the multiwall bag valve-on-a-valve that gives double sift protection for granular, pelletized or pulverized products.

In that time, DUETTE Multiwalls have been used by many of the leading chemical and fertilizer manufacturers, with consistently gratifying results. The diagrammatic pictures show why . . .



WON'T CLOG . . . The Magic Yellow check flap falls freely aside from the valve slit. The sleeve won't choke or clog the packing spout.

POSITIVE CLOSING ACTION . . . This diagrammatic picture shows the action as the Magic Yellow flap starts to close over the valve slit.

CAN'T SIFT . . . When the bag is filled, the flap, acting as a check valve, completely overlaps and covers the valve slit, to stop sifting.

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In the world of bags...Burlap is king

Want *important* savings? Use burlap. You save on space, because burlap bags stack higher. You save on waste...burlap keeps breakage down. You save on handling costs...only burlap can take on 200 pound loads. You save on the bags themselves...burlap is re-usable. And another big plus...the farmer likes burlap. *He* asks for it. You should too.

THE BURLAP COUNCIL · 122 East 42nd Street, New York 17

Borate your Fertilizers...

adding boron boosts profits!

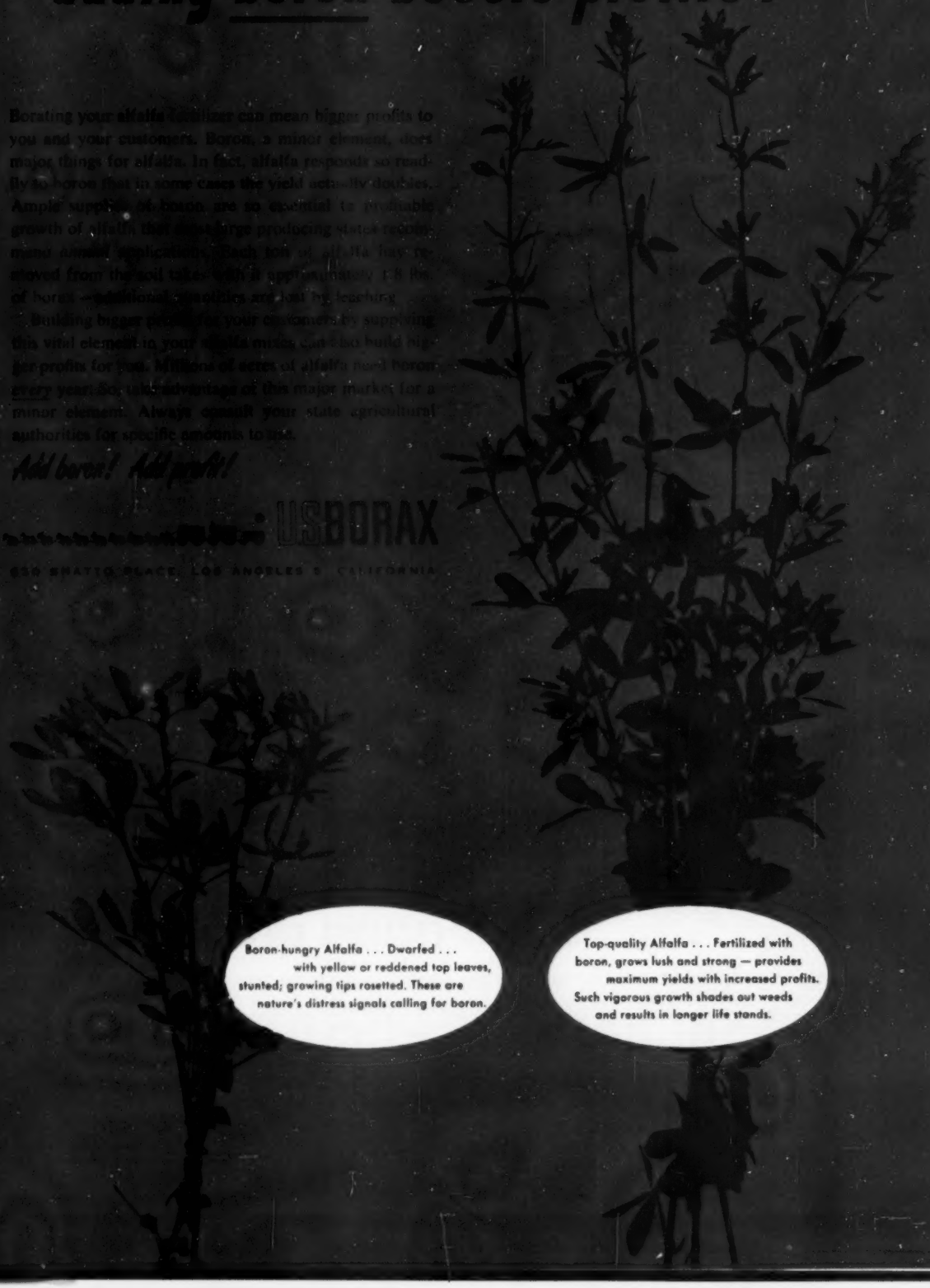
Borating your alfalfa fertilizer can mean bigger profits to you and your customers. Boron, a minor element, does major things for alfalfa. In fact, alfalfa responds so readily to boron that in some cases the yield actually doubles. Ample supplies of boron are so essential to profitable growth of alfalfa that even large producing states recommend annual applications. Each ton of alfalfa hay removed from the soil takes with it approximately 1.8 lbs. of boron — additional quantities are lost by leaching.

Building bigger profits for your customers by supplying this vital element in your alfalfa mixes can also build higher profits for you. Millions of acres of alfalfa need boron every year. So take advantage of this major market for a minor element. Always consult your state agricultural authorities for specific amounts to use.

Add boron! Add profit!

U.S. BORAX

630 SHATTO PLACE, LOS ANGELES 5, CALIFORNIA



Boron-hungry Alfalfa . . . Dwarfed . . . with yellow or reddened top leaves, stunted; growing tips rosetted. These are nature's distress signals calling for boron.

Top-quality Alfalfa . . . Fertilized with boron, grows lush and strong — provides maximum yields with increased profits. Such vigorous growth shades out weeds and results in longer life stands.

JUST AROUND THE CORNER

By Vernon Mount

PATRICE LUMUMBA may upset the world applecart, but he has a point, too often overlooked. The Congo was set up as an independent State, that included Katanga, which is the Ruhr of that region. On the products of Katanga was based the whole economy of the new, independent nation.

UPHEAVAL has, not surprisingly, resulted. Brother Lumumba, who is hardly an experienced administrator, wildly searches for a way to pressure Kantanga back into the fold...and he cares not that his pressures may spark a world war.

UN, and its real place in our international picture, is being tested the hard way by this African problem. And nobody can even guess at this stage how it will come out. Certainly the Russians are making hay while the sun shines!

Yours faithfully,

Vernon Mount

AACo

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• SULPHUR • ORGANICS

Foreign and Domestic Fertilizer Materials

Exclusive Sales Agents For:

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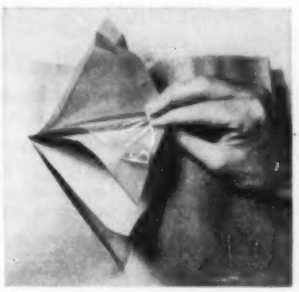
"This new CHASE POLY-PLY multiwall bag is a real Problem Solver"

Says Lee Schram, Multiwall Bag Buyer, Morton Salt Company

The Morton Salt Company needed a new and better bag for its salt shipments—a moisture-resistant bag that would be easier to handle and ship, more flexible at low temperatures, highly resistant to abrasion and rupture, yet economical in cost.

To solve this problem, Chase developed the Poly-Ply Multiwall Bag featuring an entirely new construction. It combines—for the first time—the advantages of a ply of light-weight sheet polyethylene and heavy-duty multiwall paper. It provides excellent moisture protection...extra strength...new ease of handling...flexibility even at temperatures way below zero. After six months testing under commercial conditions Morton officials report highly satisfactory results!

If you package moisture-sensitive products—such as sugar, chemicals or fertilizers—this new bag can be a problem solver for you, too. It is now available in 25-, 50- and 100-pound sizes. Call your Chase representative for full information.



New and Unique Construction: separate, intermediate ply of sheet polyethylene, shielded by heavy-duty kraft paper inside and out, assures effective moisture protection, strength and easy handling advantages.

CHASE BAG COMPANY

355 Lexington Avenue • New York 17, N.Y. • 32 plants and sales offices coast to coast

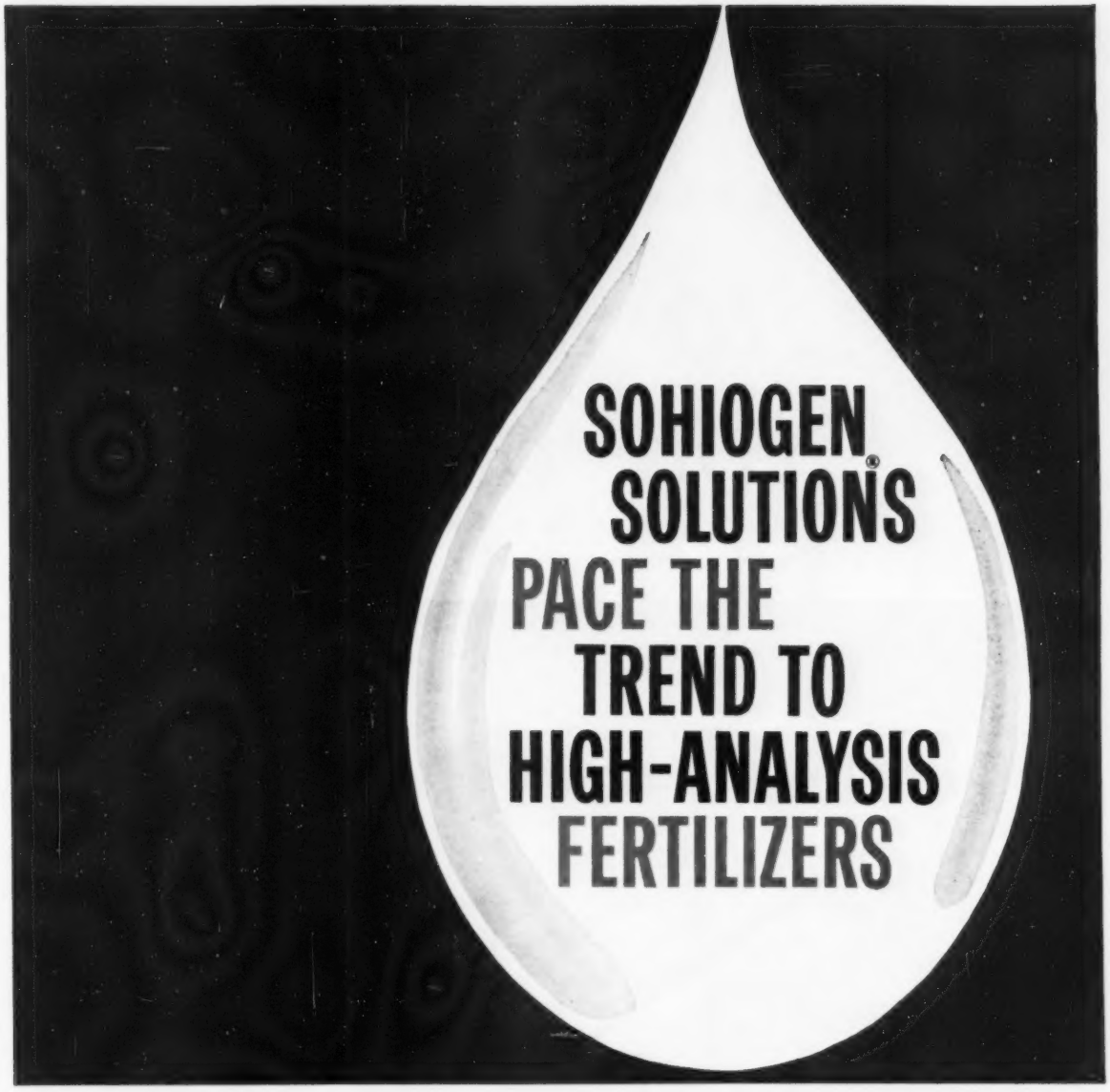
when you need the right chains and buckets in a hurry

For over 70 years Rex has been serving the fertilizer industry with a complete line of chains, buckets and allied equipment—and with an *obsessive* desire to be there fastest with the best.

Those who know Rex know they can get fast service and top quality—always—from a nearby Rex Distributor or CHAIN Belt Warehouse.

CHAIN Belt Company, 4706 W. Greenfield Ave., Milwaukee 1, Wis.
CHAIN Belt (Canada) Ltd., 1181 Sheppard Ave. East, Toronto.

REX®
CHAIN BELT COMPANY



With changes coming at a startling rate in the fertilizer business, just keeping up with them can be a problem. But Sohio keeps its customers ahead of the trend to high-analysis fertilizers by tailoring solutions to the times.

Sohio specialists who work with you match your requirements from a full line of Sohiogen solutions and Sohio nitrogen materials — ammonia, ammonium nitrate, and urea — blended to a wide range of chemical and physical properties.

Technical help. The right material for your job. Johnny-on-the-spot delivery. All add up to fewer problems and lower production costs at your end of the line. Ask your "Man from Sohio" for the full story.

YOU GET THESE EXTRA ADVANTAGES WHEN YOU DEAL WITH SOHIO:

- Higher nitrogen content solutions (concentrated solutions containing less water).
- Higher fixed-to-free ratio solutions (solutions containing higher ratio of salts to ammonia).
- Development of new solutions to satisfy specific needs for higher fixed-to-free ratio solutions.
- Addition of urea to lower saturation temperatures (making it possible to use special solutions).
- Full technical assistance and service in using more solutions for production of fertilizers.
- Development of solutions adapted to preneutralization.

...we're serious about SERVICE at Sohio

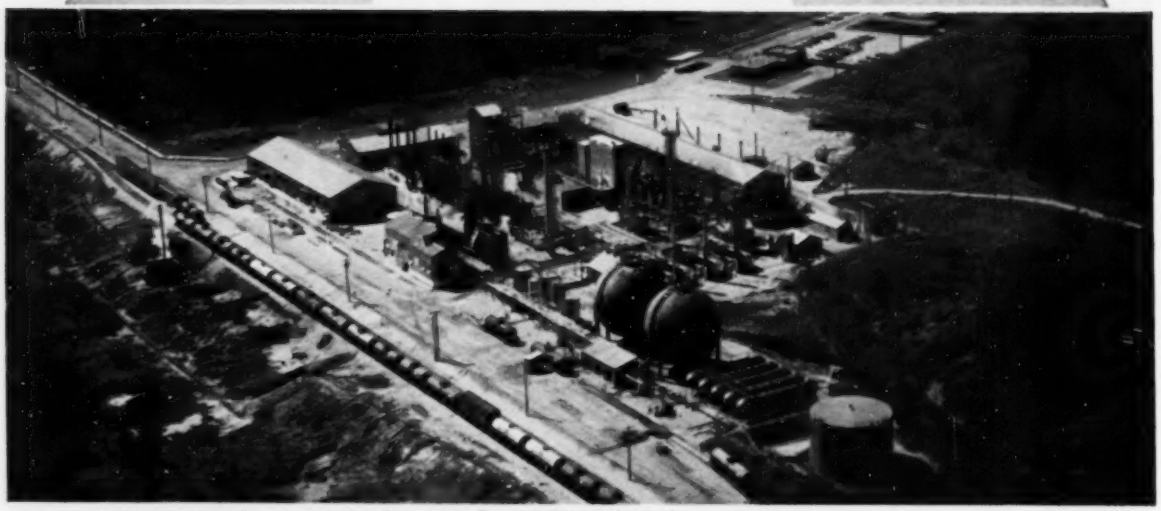
SOHIO CHEMICAL COMPANY

Agent for Solar Nitrogen Chemicals, Inc.

Fort Amanda Rd., P.O. Box 628 • Lima, Ohio
Phone CApitol 5-8015 or wire (TWX call letters LIMA O 497-U)

ARMOUR'S PROGRAM OF PROGRESS

...to serve you better.....



● Armour's modern ammonia plant near Crystal City, Missouri

For over sixty years, Armour has been serving American Agriculture; supplying the ever-growing demand for Armour and Vertagreen brand complete fertilizers by farmers and home gardeners. For more than a decade, we have served the fertilizer industry with phosphate products from our modern phosphate facilities in Bartow, Florida.

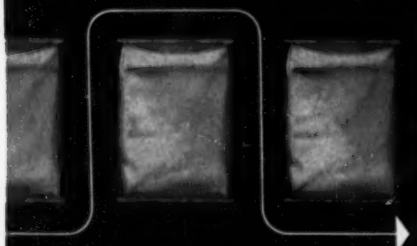
Each year, it has been our aim to improve our facilities, products and services. In 1959, Armour took another step forward to serve you better with the acquisition of a modern ammonia plant at Crystal City, Missouri. Now, Armour's service to agriculture and the industry is more complete than ever.

As America's needs for more and better fertilizers continue to grow, Armour Agricultural Chemical Company will continue to improve the products and services that have made the Armour "A" a symbol of quality in the fertilizer industry . . . the "BIG A" in agriculture.

31 sales offices serving the fertilizer industry

ARMOUR AGRICULTURAL CHEMICAL COMPANY
General Offices, Atlanta, Georgia

in the last two years over 210 multiwall users cut their packaging costs through a UNION-CAMP



PLANT SURVEY

another FREE service of the 5 Star Packaging Efficiency Plan!

UNION-CAMP's 5-Star Plan has helped over 210 firms reduce their materials handling costs within the last two years alone. The economies resulted directly from a single service feature of the plan . . . a plant survey.

One survey, made for a midwest packer, speeded his multiwall handling operation by 50 per cent. Another company, by following UNION-CAMP recommendations, released labor for more productive functions and saved $37,584. A third multiwall user lowered his costs by nearly $50,000 a year. And there are many more such success stories.

A UNION-CAMP multiwall specialist will be glad to review your present operation . . . show you how the 5-Star Plan can help produce more economical, more efficient control. The plan also covers bag design, bag construction, specifications control and packaging machinery. It's yours without cost or obligation.

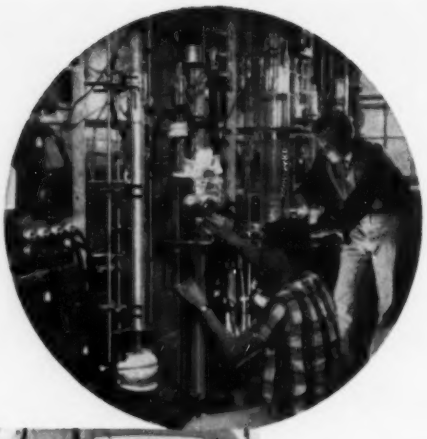
Why not start cashing in on it today?

UNION-CAMP®

MULTIWALL BAGS

Union Bag-Camp Paper Corporation · 233 Broadway N.Y. 7, N.Y.

★ BAG DESIGN · BAG CONSTRUCTION · SPECIFICATIONS CONTROL · PACKAGING MACHINERY · PLANT SURVEY



QUALITY

Texaco offers chemical solutions that consistently meet your formulations' requirements as to ingredient quality.

AVAILABILITY

because of its centrally located Lockport (Ill.) facility, Texaco provides immediate delivery of both nitrogen solutions and ammonia (including 50% aqua solution).

SERVICE

Texaco offers a wide range of technical services to help you break a production bottleneck or develop a new product.

To **BALANCE** fertilizer formulations ...begin with this Texaco formula

Here's a formula that can help you balance all the factors effecting fertilizer formulations. The ingredients? You can see them above: Texaco quality, availability, and service.

But why not weigh the advantages of this service yourself? Write for details—and our free 40-page manual on ammonia and nitrogen solutions—to Texaco Inc., *Petrochemical Sales Division,* 332 South Michigan Ave., Chicago 4, Ill., or 135 East 42nd Street, New York 17, N. Y.

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TEXACO

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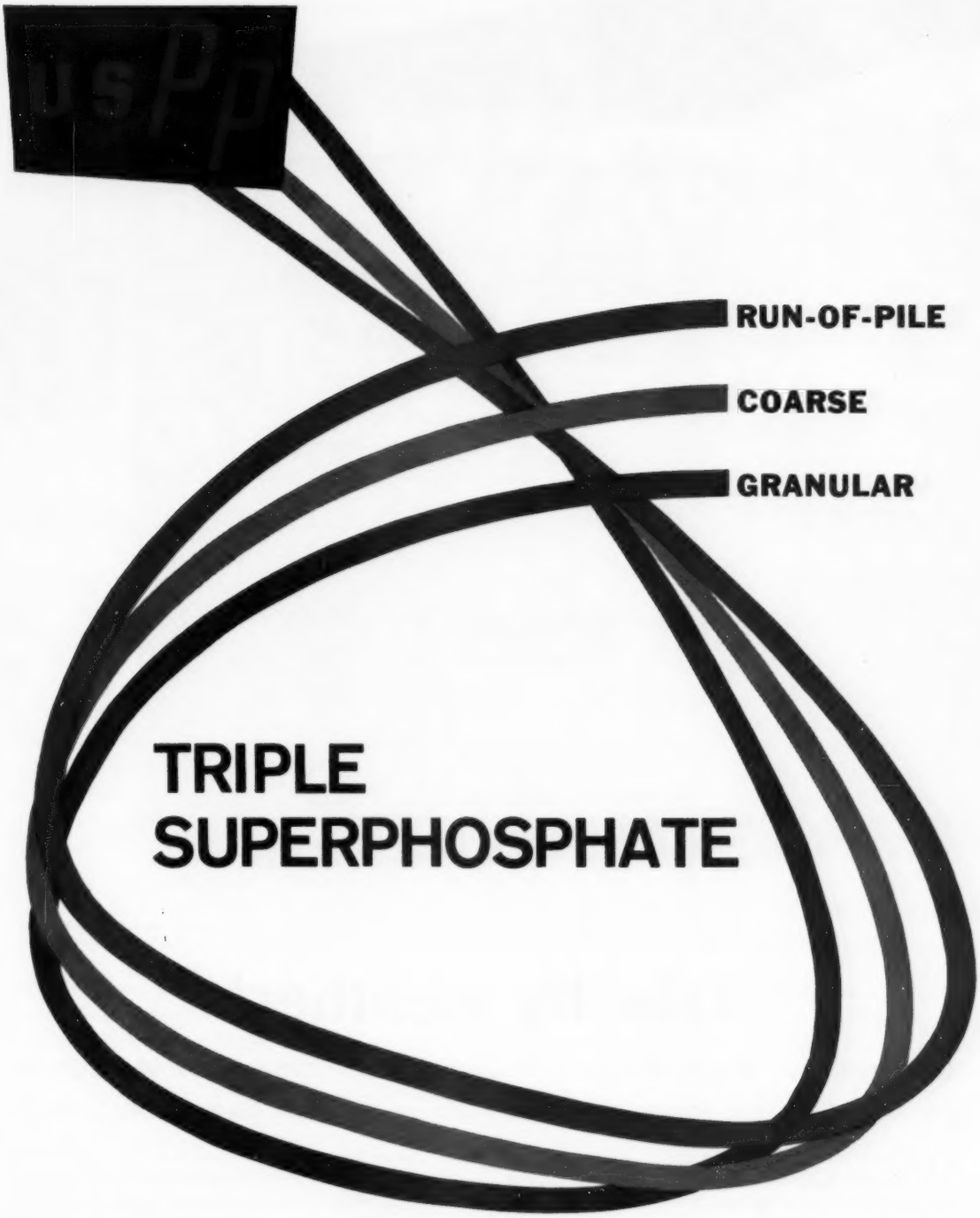


For requirements—Contact Our Sales Agents **BRADLEY & BAKER**

Bagpak Pallet by International Paper

These tough pallets still do their job after long-haul shipment and months of snow and freezing temperatures.

Trial by weather!

International Paper Bagpak® Pallets survive prolonged storage in snow and severe winter weather with no damage to multiwall bags.

WE DON'T recommend storing Bagpak Pallets in the snow. But when one of our up-state New York customers did, he learned the meaning of *real* protection.

The pallets in our photograph, travel-worn and weather-beaten but still completely serviceable, survived the rigors of shipment, *plus* exposure to winter weather for several months! When they were opened, *every* multiwall bag was safe and uniform. And ready to do its job—no matter how tough.

International Paper pioneered this method of shipping and handling multiwalls. Our pallets now have *four* years of on-the-job experience.

And the Bagpak Pallet has a rigid construction that eliminates transit damage due to abrasion. Plus a square design that means a big saving in storage area.

Sixty-two years of papermaking and materials-handling experience are compressed into every Bagpak Pallet. And these rugged pallets are only part of a *complete* multiwall packaging service offered to you by International Paper – world's most experienced papermaker.

Whatever your multiwall packaging needs, you will find it profitable to talk to your Bagpak packaging engineer. He has complete information. It's yours for the asking.

INTERNATIONAL PAPER
BAGPAK DIVISION • NEW YORK 17, N. Y.

Arcadian® News

Volume 5 | For Manufacturers of Mixed Fertilizers | Number 9

ANNOUNCING the New ARCADIAN® Solution that supplies NITRATE, AMMONIA and ORGANIC Nitrogen

DURANA*

CHEMICAL COMPOSITION %							PHYSICAL PROPERTIES		
Total Nitrogen	Anhydrous Ammonia	Ammonium Nitrate	Urea	Formaldehyde	Water	Neutralizing Ammonia Per Unit of Total N (lbs.)	Approx. Sp. Grav. at 60°F	Approx. Vap. Pres. at 104°F per Sq. In. Gauge	Approx. Temp. at Which Salt Begins to Crystallize °F
37.0	13.3	53.4	15.9	8.0	9.4	7.2	1.235	0	36

DURANA is a new and different ARCADIAN Nitrogen Solution created by Allied Chemical research for fertilizer manufacturers who wish to produce premium-grade complete fertilizers containing nitrate nitrogen, ammonia nitrogen, and water-insoluble organic nitrogen. DURANA supplies all these forms of nitrogen economically in one ammoniating solution containing a total of 37% nitrogen.

Through the proper use of DURANA in manufacturing mixed fertilizer, approximately 20% of the total nitrogen from the solution is converted to water-insoluble organic nitrogen in the process of producing the fertilizer. As shipped, DURANA supplies approximately 25% of its total nitrogen as nitrate nitrogen and 55% as ammonia nitrogen.

DURANA Solution is an excellent source of nitrogen for the production of premium grades, such as tobacco fertilizers and specialty fertilizers. The agronomic value of nitrate, ammonia and organic nitrogen in such fertilizers is well established. In addition to providing these three forms of nitrogen, DURANA helps give fertilizers excellent mechanical condition and facilitates the production of granular-type fertilizers.

DURANA helps fertilizer manufacturers meet official recommendations. For example, North Carolina, Georgia and other states recommend a certain amount of nitrate nitrogen in tobacco fertilizers to get young plants off to a good start, particularly following chemical treatment of soils. DURANA supplies nitrate nitrogen plus slower-acting forms for continued healthy growth.

DURANA Solution *(formerly called Special "F" Solution)* was tested in many areas last spring with outstanding results. Production facilities are now being expanded to meet the anticipated demand for this new-type solution.

DURANA Nitrogen Solution is produced and sold exclusively by Nitrogen Division, Allied Chemical Corporation. It is a product of Allied Chemical research—the same research that originated nitrogen solutions for ammoniating superphosphate more than 30 years ago. Through the years, this continuing research has brought you many new methods and materials for making better fertilizers. For information about DURANA and other ARCADIAN Nitrogen Products, contact Nitrogen Division, Allied Chemical, 40 Rector Street, New York 6, N.Y.

*DURANA is a trade-mark of Allied Chemical Corporation

The HOW and WHY of Fluid Flow Measurement

Let's consider the rotameter. It is an apparently simple device for measuring the rate of flow of the various liquids that are used in the manufacture of mixed fertilizers. Although there are many different designs, all rotameters function in essentially the same way. Figure 1 illustrates the principal elements of a common type of rotameter.

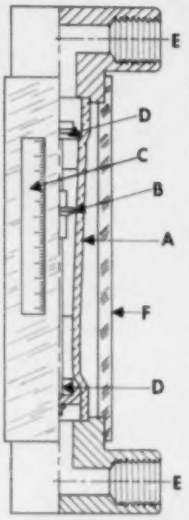


FIGURE 1

Front view of typical rotameter.
A: tapered glass tube.
B: measuring float.
C: flow rate scale.
D: stops to hold float.
E: inlet and outlet connections.
F: shield glass.

Here are the outstanding features of the rotameter:

1. **It's a completely self-contained unit.**
2. **It measures both very small and very large rates of flow. The range from the smallest to the largest flow rate can be as great as 20 to 1, with good accuracy.**
3. **Dozens of different accessories can be added for conveniences such as remote rate indication, recording, totalizing and automatic control.**

On the other hand, the rotameter—like any mechanical device—has certain limitations—

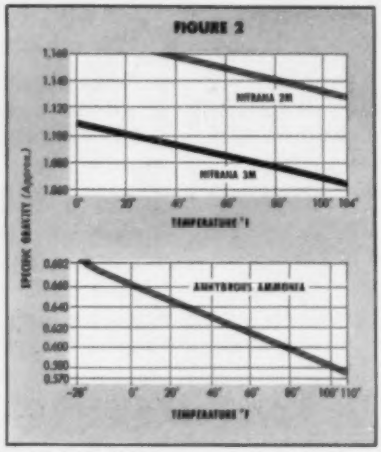
1. **The flow rate scale is correct only for a particular fluid, at one set of specific flow conditions. Variations in specific gravity, temperature or viscosity could cause appreciable errors.**
2. **The rotameter measures *volume*, not weight. Where a liquid contains gas, the scale reading actually will be in volumes of the *mixture*, and not of the liquid itself.**
3. **Difference in pressure between the rotameter's inlet and outlet may be great enough to permit some flashing of the liquid into vapor. This, of course, would cause a false reading. The flashing can be easily prevented.**

The Key Word is "Accuracy"

A rotameter designed for measuring water at 60°F will be quite accurate over a range of temperatures from 32°F to 130°F because it requires about a 72°F variation in temperature to change the specific gravity of water one percent. Not so with other liquids; more serious errors can result from changes in temperature, specific gravity or viscosity. For example, Figure 2 illustrates the marked influence that temperature exerts on the specific gravity of ARCADIAN NITRANA 2M and 3M, and ARCADIAN Anhydrous Ammonia.

NITRANA 2, 2M, 3, 3M and 7, and URANA 10, 12, 13 and 15 gain or lose about 1% in specific gravity for each corresponding 29°F change in temperature. For a similar change in specific gravity, NITRANA 6 requires about a 27°F temperature variation; NITRANA 4 and 4M, 33°F; U-A-S A, 50°F; U-A-S B, 22°F. ARCADIAN Anhydrous Ammonia is much more sensitive, requiring a mere 6°F temperature change to vary its specific gravity by one percent. The exact degree of change exerted by temperature on the specific gravity of any ARCADIAN Nitrogen Solution is always available from Nitrogen Division.

FIGURE 2



Influence of temperature on specific gravity.

Calibrating the Rotameter

Because there are variables involved in the composition of nitrogen solutions, and in the temperatures at which they are used, rotameters must be calibrated for accuracy. One method is to have liquid flow through the rotameter at a known rate for a known time, and then check for actual volume delivered. For example, a steady flow of liquid can be maintained and caught in a bucket or drum over a period of time (measured by stop-watch). This is simple with water and some other liquids, but proves more involved with volatile liquids such as some nitrogen solutions. These would have to be measured into a weighed amount of water or into a measuring tank under sufficient pressure to retain the ammonia.

In Figure 3 we have a curve that enables us to change from water calibration to calibration for URANA, NITRANA, or any other ARCADIAN Nitrogen Solution.

Let's assume that we have a rotameter which is designed for NITRANA 3, flowing at 60°F and 20 pounds per square inch gauge. The scale reads in gallons per minute at a density of 1.079, and the maximum capacity is 100 gpm. When we test the rotameter by putting enough water through it to make the scale read a steady 50 gpm, we find that in one minute we collect 52.4 gallons of water in our drum. Our calibration curve tells us that the Conversion Factor for a liquid of 1.079 density is 0.955. Multiplying the measured quantity of water, 52.4 gallons, by Conversion Factor 0.955 gives us 50.0, which checks out with our gpm setting.

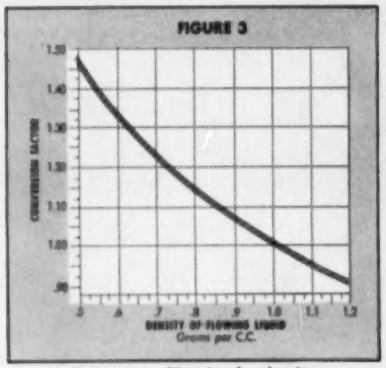
Let us suppose that another rotameter, designed for the same NITRANA 3 service, is tested and we find that we collect 54 gallons in one minute when the water flow rate reads a steady 50 gpm. Applying our Conversion Factor 0.955 again, we find that this rotameter delivered 1.6 more gallons than called for. Putting this error into percentage form ($\frac{1.6}{50} \times 100$) we arrive at 3.2%. That is, the rotameter, when in use with a liquid of 1.079 density, will deliver 3.2% more gallons than indicated by the observed flow rate. It's a simple matter, then, to apply this calibration to the gpm rate so as to get accurate flow measurement for this particular fluid.

Viscosity affects Accuracy

The Conversion Factor curve in Figure 3 is drawn for floats made from stainless steel, and for liquids whose viscosity is not much greater than that of water. Where viscosities run higher—even up to about 10 times that of water—rotameters can still be accurate, provided that the floats are specially designed for the purpose.

Fortunately, all ARCADIAN Nitrogen Solutions have low enough viscosities at their lowest practical operating temperatures to make for satisfactory usage with practically all conventional rotameters.

ARCADIAN, NITRANA, URANA, URAN and U-A-S are registered trade-marks of Allied Chemical Corporation.



Rotameter calibration for density.

Fluids such as phosphoric and sulphuric acids, and some solutions in the industry get quite "thick" or viscous at cooler temperatures. So much so that they cause considerable error in flow measurement if they are not heated up a little to improve fluidity. ARCADIAN Nitrogen Solutions flow easily at operating temperatures.

Derivation of "CF" Curve

For those who are interested in the derivation of the "CF" (Conversion Factor) curve in Figure 3, here is the equation used:

$$F = \sqrt{\left(\frac{1}{\frac{Rf}{R}-1}\right)\left(\frac{Rf}{R}-1\right)} = \text{Conversion Factor}$$

Rf = specific gravity of the float

R = specific gravity of the flowing liquid

In order to draw a curve with the widest possible application, we have made Rf equal to 8.000, which is a fair value for stainless steel floats. If a float of other material and density is used, simply substitute the actual value for Rf in the formula.

This curve can also be used to find the Conversion Factor for fluids of different density than the one for which the float was designed. For example: suppose we have a rotameter with a float designed for use with NITRANA 3, specific gravity 1.079. The curve tells us that the Conversion Factor is 0.955. Now, if we want to use this rotameter on U-A-S A, specific gravity 0.932, we check the curve and find that F equals 1.04. Then, by computation, we find that: $CF = \frac{1.04}{.955} = 1.09$

This means that when the rotameter reads 20 gpm of U-A-S A, the actual flow is 21.8 gpm. The reason why CF in this case is greater than 1.0 is that the lighter fluid does not lift the float as high as heavier fluid would at the same flow.

If you would like more information on rotameters, or any technical problem involving nitrogen solutions, just write: Technical Service, Nitrogen Division, Allied Chemical Corporation, 40 Rector Street, New York 6, N. Y.

Benefits of Sulphur in Mixed Fertilizer

It pays to tell farmers about the valuable extra benefits they get from the sulphur you put in your fertilizers. They pay for nitrogen, phosphoric acid and potash. At no extra cost, you give them sulphur which is an important plant food. Many farmers are not aware of this fact. They do not realize the need for sulphur in crop production until serious deficiencies occur.

The fertilizers you make by ammoniating superphosphate are a rich source of sulphur. Normal superphosphate contains more sulphur and more calcium than phosphorus. When you use sulphuric acid to neutralize "excess" ammonia in producing high-nitrogen mixtures, you add sulphur to your fertilizer. And, of course, sulphate of ammonia in fertilizers adds sulphur. On the other hand, concentrated fertilizers made with triple superphosphate and ammonium phosphate are deficient in sulphur.

It is easy to calculate the amount of sulphur your fertilizer contains. *Make this a sales point!* Tell your customers they are getting valuable quantities of sulphur and paying nothing for it except transportation costs. This is an extra bonus.

The shortage of sulphur is becoming critical for crop production on many soils. Crops, on the average, remove about as much sulphur from the soil as they do phosphorus. Cotton, corn, tobacco, legumes, grass, onions and cabbage are heavy users of sulphur.

Crop Response to Sulphur

Field tests in many areas of the country now show definite response of crops to additional sulphur. In Western range tests with native grass, where nitrogen alone produced 1,106 pounds dry weight per acre, nitrogen plus sulphur produced 1,837 pounds dry weight grass per acre.

In Nebraska, corn has shown considerable yield improvement with sulphur. Where average yield was 66 bushels per acre, sulphur alone brought yield up to 72 bushels per acre and sulphur plus zinc increased yield to 77 bushels per acre.

Why Yellow Plants

Corn and other crops lacking sulphur often show pale yellow leaf color, similar to that in nitrogen deficiency. This is because sulphur is needed to produce the essential amino acids that go into making the protein of plant cells.

In Florida, many tests have been made on minor element deficiencies in soils. Since these elements are often supplied as sulphates, additional tests have been run with fertilizers free of sulphur, to determine what elements produced the crop response. Conclusions show that sulphur produced the following increases in yield:

Crop	Yield Increase
Cotton	35%
Corn	40%
Oats	50%
Peanuts	80%
Legumes	60%
Tobacco	40%

In some of these tests, omission of phosphorus had no effect on yield, but omission of sulphur severely reduced yields. In many other parts of the country, too, lack of sulphur in mixed fertilizers, or low per-acre application rates of such fertilizers, will reduce yields seriously in one to three years. With the present urgency to keep yields high to cut production cost per bushel or bale, sulphur should be in the fertilizer every year.

West-coast states have long been using about 750,000 tons of gypsum or calcium sulphate per year as a soil conditioner and source of sulphur. Up to now mixed fertilizers, containing gypsum in regular superphosphate, have been supplying needed sulphur in other areas. When you make high-analysis fertilizers by ammoniating superphosphate with ARCADIAN Nitrogen Solutions, you are supplying farmers needed sulphur for better yields and profits.

Per Cent of Sulphur in Fertilizers made from Ammoniated Superphosphate	
16-8-8	8.5%
15-10-10	7.6%
12-12-12	7.0%
6-12-12	7.3%
4-16-16	6.7%
5-20-20	4.0%
6-24-24	less than 1%
13-39-0	less than 1%

This indicates that sulphur deficiences will show up fast where small amounts of low-nitrogen starter fertilizers are used in the row, without top-dressing, side-dressing or plowdown of balanced mixed fertilizer or superphosphate.

It will pay you to tell dealers and farmers about the sulphur content of your mixed fertilizers. SULPHUR can be a SALES-MAKER for YOU!

Arcadian® NITROGEN SOLUTIONS

	CHEMICAL COMPOSITION %						PHYSICAL PROPERTIES		
	Total Nitrogen	Anhydrous Ammonia	Ammonium Nitrate	Urea	Water	Neutralizing Ammonia Per Unit of Total N (lbs.)	Approx. Sp. Grav. at 60°F	Approx. Vap. Press. at 104°F per Sq. In. Gauge	Approx. Temp. at Which Salt Begins to Crystallize °F
NITRANA®									
2	41.0	22.2	65.0	—	12.8	10.8	1.137	10	21
2M	44.0	23.8	69.8	—	6.4	10.8	1.147	18	15
3	41.0	26.3	55.5	—	18.2	12.8	1.079	17	-25
3M	44.0	28.0	60.0	—	12.0	12.7	1.083	25	-36
3MC	47.0	29.7	64.5	—	5.8	12.6	1.089	34	-30
4	37.0	16.6	66.8	—	16.6	8.9	1.184	1	56
4M	41.0	19.0	72.5	—	8.5	9.2	1.194	7	61
6	49.0	34.0	60.0	—	6.0	13.9	1.050	48	-52
7	45.0	25.3	69.2	—	5.5	11.2	1.134	22	1
URANA®									
6C	43.0	20.0	68.0	6.0	6.0	9.3	1.180	12	39
6M	44.0	22.0	66.0	6.0	6.0	10.0	1.158	17	14
10	44.4	24.5	56.0	10.0	9.5	11.0	1.114	22	-15
11	41.0	19.0	58.0	11.0	12.0	9.2	1.162	10	7
12	44.4	26.0	50.0	12.0	12.0	11.7	1.087	25	- 7
13	49.0	33.0	45.1	13.0	8.9	13.5	1.033	51	-17
DURANA*									
DURANA is a trade-mark of Allied Chemical Corporation.	37.0	13.3	53.4	15.9	9.4	7.2	1.235	0	36
U-A-S®									
A	45.4	36.8	—	32.5	30.7	16.2	0.932	57	16
B	45.3	30.6	—	43.1	26.3	13.5	0.978	48	46
Anhydrous Ammonia	82.2	99.9	—	—	—	24.3	0.618	211	-108

*DURANA contains 8% formaldehyde.

Other ARCADIAN® Products: URAN® and FERAN® Solutions • Ammonia Liquor • N-dure® A-N-L® • Ammonium Nitrate • UREA 45 • Nitrate of Soda • Sulphate of Ammonia

When you purchase your nitrogen requirements from Nitrogen Division, Allied Chemical, you have many different nitrogen solutions from which to select those best suited to your ammoniation methods and equipment. You are served by America's leading producer of the most complete line of nitrogen products on the market. You get formulation assistance and technical help on manufacturing problems from the Nitrogen Division technical service staff. You benefit from millions of tons of nitrogen experience and the enterprising research that originated and developed nitrogen solutions.

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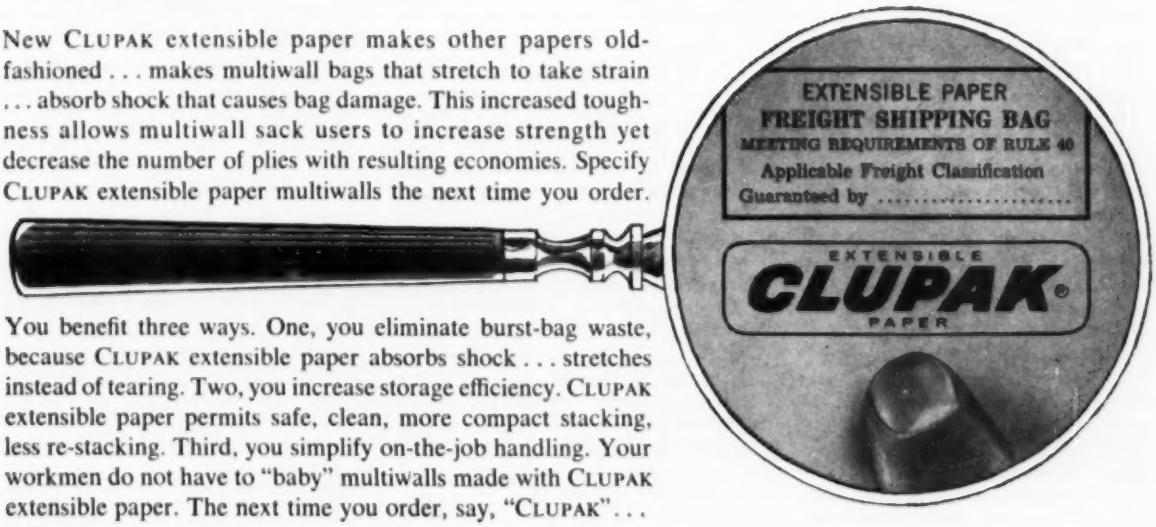

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Fifty Years

of Superphosphate

in the United States

by K. D. Jacob

Fertilizer Investigations Research Branch
Soil and Water Conservation Research Division
Agricultural Research Service
U. S. Department of Agriculture
Beltsville, Maryland

The author, Kenneth D. Jacob, is one of the world's foremost authorities on phosphate fertilizers. He began his studies on phosphates in 1919 when he joined U.S.D.A., where he now serves as special assistant to the director of Soil and Water Conservation Research Service. Before his elevation to that post last year, he had served as chief of the Fertilizer Investigations Research Branch. Dr. Jacob received the U.S.D.A. Superior Service Award in 1947 for his research on world phosphate resources, technology and the initiation of the one-step thermal method of producing available phosphate material from raw phosphate. 'Jake,' as he is known to many friends throughout the fertilizer industry, was again honored in 1958 when he received the Harvey W. Wiley Award of the Association of Official Agricultural Chemists for his work in the fields of fertilizer technology and analysis, and "contributions to understanding of the role of phosphates in fertilizer utilization" which "benefitted not only American agriculture, but the welfare of man throughout the civilized world."

K. D. Jacob

Superphosphate has been the principal source of chemically processed plant-nutrient phosphorus since the beginning of the world's chemical fertilizer industry around 1840. Although it still was virtually the only source of such phosphorus in many countries a half-century ago, its dominance has been increasingly threatened by other phosphates in recent years, especially since World War II. Superphosphate has continued, nevertheless, to supply the greater portion of the world's output of fertilizer phosphorus in chemically processed forms.

In the year ended June 30, 1958, for example, superphosphate accounted for two-thirds of the world's primary production of P_2O_5 as commercial fertilizers exclusive of ground phosphate rock applied directly to the soil (Table 1). Among the continents the portion ranged from 46 percent in South America to more than 99 percent in Oceania, with 84 percent in North America and over 87 percent in the United States. Basic slag supplied 29 percent of the European production—but only negligible proportions in the other continents—while the remainder of the nonsuperphosphate P_2O_5 was mostly in the form of ammonium phosphates and, chiefly, so-called complex fertilizers. Ammonium phosphates were the only nonsuperphosphate products reported for Canada and the principal ones for the United States.

Manufacturing Facilities

For some 50 years the annual publications "Commercial Fertilizer Year Book" and "Farm Chemicals Handbook" (formerly "The American Fertilizer Hand Book") have listed the superphosphate plants in the United States and Territories, and for certain years the facilities have been discussed by Adams **et al.** (**2**)[1], the Federal Trade Commission (**3**), Jacob (**4, 5, 6**), and Mehring (**7**). The earlier issues of the annual publications, however, often did not accurately portray the status of the superphosphate industry, for various reasons, such as incomplete identification of the fertilizer factories having superphosphate plants, inclusion of discontinued plants, and omission, duplication, and improper designation of plants.

Tables 2 and 3 show the number and geographical distribution of superphosphate plants in the United States at intervals from 1910 to 1959. The data for 1941 to 1959 were compiled from information obtained directly from all companies known to have superphosphate plants. The data on normal superphosphate[2] plants in 1920 and 1930 were compiled from listings in "The American Fertilizer Hand Book," with correction and supplementation by information obtained from the fertilizer companies and other sources.

Between 1914 and 1941 the number of normal superphosphate plants decreased from 257 to 148 (Table 2). This period was characterized by the closing of many small or poorly located plants and the concentration of production in larger plants capable of more economical operation and better situated with respect to transportation facilities and consuming areas, a trend which was further favored during the depression years by the greatly decreased consumption of fertilizer and by other adverse conditions. The downward trend was then reversed under the stimulus of war and postwar de-

[1] Bold face numerals in parentheses refer to "Literature Cited" at end of paper.

[2] The term "normal superphosphate" refers to the products made by treating natural phosphates with sulfuric acid alone.

mands and of great expansion in phosphate consumption in the newer areas of fertilizer use. Thus the number of plants was 204 in 1951—159 in 1945 and 189 in 1948 (**6**)—and 217 in 1959. Large changes also occurred in the number of companies operating normal superphosphate plants[5]—120 in 1920, 93 in 1930, 56 in 1941, 87 in 1951, and 89 in 1959—with a definite trend to concentration of the facilities in fewer hands. The average number of plants per company increased from 1.9 in 1920 to 2.6 in 1941 and was 2.4 in 1959.

The last 50 years have witnessed great changes in the regional distribution of normal superphosphate plants, the shift being markedly westward (Table 3). The Atlantic Coast States had 66 percent of the plants in 1914 but only 37 percent in 1959. The number of plants in these States decreased 54 percent in 1914 to 1941 but remained nearly constant in later years, whereas the other regions generally showed little change until after World War II. Among the areas showing increases in facilities, the change was especially significant in the North Central region and the West South Central region, which, respectively, had 12 and 4 percent of the plants in 1914 as compared with 28 and 13 percent in 1959; during this time the number of plants in these regions increased 103 and 222 percent, respectively.

The normal superphosphate plants were distributed among 26 States (including Hawaii) in 1914 to 1930, 22 in 1941, 33 in 1951, and 34 in 1959. Georgia has long been first in the number of plants—54 in 1914, 24 in 1959. South Carolina ranked second in 1914 (25 plants) but was tied with Alabama and Virginia for seventh place in 1959 (11 plants). Ohio—tied with North Carolina for fifth place in 1914 (16 plants)—advanced to second place in 1959 (18 plants). Georgia lost the most plants (30) during this period, while the greatest gain (11 plants) was in Texas which had only one plant in 1914.

The number of towns and cities having normal superphosphate plants decreased from 126 in 1920 to 114 in 1930 and then to 93 in 1941, a trend which was especially marked in the Middle Atlantic and South Atlantic regions. In later years, however, the trend has been sharply reversed—135 locations in 1951 and 156 in 1959—particularly in the North Central and South Central regions, areas which have recently shown great increases in fertilizer use. In 1920 nine urban areas had at least five normal superphosphate plants: Baltimore, Md., 12; Atlanta-East Point, Ga., 12; Charleston, S. C., 11; Savannah, Ga., 10; Montgomery, Ala., 7; Wilmington, N. C., 6; and Norfolk, Va., Jacksonville, Fla., and Cincinnati-Lockland, Ohio, 5 each. All but two of these areas (Norfolk and Cincinnati-Lockland) had fewer plants in 1959. In the latter year seven areas had five or more plants: Norfolk, 6; East St. Louis-National Stock Yards, Ill., 6; and Baltimore, Charleston, Savannah, Cincinnati-Lockland, and Indianapolis, Ind., 5 each. Other prominent centers of superphosphate production in 1920 to 1959 included Carteret, N. J., Columbus, Ohio, Greensboro, N. C., Nashville, Tenn., Philadelphia, Pa., and Shreveport, La.

Facilities for making sulfuric acid

[5] Companies operating under different names but having the same officials are included as one company, as are companies known to be subsidiaries of, or controlled by, another company.

Table 1.—World production of P_2O_5 for fertilizer, by continents, year ended June 30, 1958[1]

Continent	Total, Short tons	Portion as superphosphate, percent[2]
Europe[3]	4,224,888	47.1
North America[4]	2,643,563	83.9
Oceania[5]	703,202	99.4
Asia[6]	472,597	72.5
Africa	314,270	95.4
South America	93,718	45.9
Total	**8,452,238**	**66.2**

[1] Page (**1**). Excludes ground phosphate rock applied directly as fertilizer.

[2] Normal, enriched, and concentrated superphosphates.

[3] Excludes the Union of Soviet Socialist Republics. The total includes estimates for Czechoslovakia, Eastern Germany, Hungary and Rumania, but data on production of P_2O_5 as superphosphates in these countries are lacking.

[4] United States (2,172,655 tons, 87.4%) Canada, Mexico, and Cuba. No production reported for Central America.

[5] Australia and New Zealand.

[6] Excludes the Chinese People's Republic and North Korea.

Table 2.—Number of plants and annual capacity for manufacture of normal superphosphate (including wet-base goods) and concentrated superphosphate in the United States, stated years 1910-59[1]

Year	Normal superphosphate		Concentrated superphosphate[4]	
	Plants, number[2]	Available P_2O_5, short tons[3]	Plants, number	Available P_2O_5, short tons[5]
1910	----	940,000	2[6]	3,000
1914	257	----	----	----
1920	230	1,440,000	2[7]	7,000
1930	196	1,600,000	6[8]	44,000[9]
1940	----	----	8[10]	180,000
1941[11]	148	1,517,280	----	----
1951[12]	204	2,982,194	9[13]	356,858[13]
1959	217[14]	3,141,135[14]	14[15]	1,068,420[15]

[1] Includes the Territories except as indicated. The original data have been corrected for known errors where possible, including duplications, omissions, and discontinuances.

[2] 1914, U. S. Federal Trade Commission (**3**); 1920-30, "The American Fertilizer Hand Book"; 1941, Jacob (**4**); 1951, Adams **et al.** (**2**). Includes one plant in Hawaii in each year and one plant in Puerto Rico in 1941 and 1951.

[3] 1910-30, Mehring **et al.** (**8, p. 43**); 1941 Jacob (**4**); 1951, Adams **et al.** (**2**). The data are not on an uniform basis of plant operation (hours per day and year) from year to year (see papers cited); the capacity in 1959 is based on operation for 16 hours per day and 300 days per year, with adequate capacity for off-season storage of the superphosphate. Includes Hawaii in 1951 and 1959. Excludes Puerto Rico.

[4] 1910-40, Mehring (**7**), Mehring **et al.** (**8, p. 43**); 1951, Adams **et al.** (**2**). The data generally relate only to plants which had coexisting facilities for making phosphoric acid, which made concentrated superphosphate for use as fertilizer, and which were operated or definitely planned for operation in the designated years. Three were no plants in the Territories in any of the years.

[5] Maximum capacity under practicable conditions for operation of the individual plants on an annual basis at any time during the specific year regardless of the duration of operation, except as indicated.

[6] California, 1; South Carolina, 1.

[7] Montana, 1; South Carolina, 1.

[8] Florida, 1; Montana, 1; South Carolina, 1; Tennessee, 3. Includes Victor Chemical Works, Nashville, Tenn., which was omitted from previous data for 1930.

[9] Excludes Victor Chemical Works.

[10] Alabama, 1; Florida, 2; Montana, 1; South Carolina, 1; Tennessee, 3.

[11] Active plants as of December 31; 7 additional plants (total capacity 42,480 tons of available P_2O_5), all in the continental United States, were inactive in 1941 but could have been operated without extensive repair and (or) purchase of new equipment.

[12] Active plants as of September 1.

[13] Alabama, 1; Florida, 3; Idaho, 1; Montana, 1; New Jersey, 1; South Carolina, 1; Tennessee, 1. Includes plant of I. P. Thomas and Son Co., Paulsboro, N. J., which manufactured concentrated superphosphate but did not have coexisting facilities for making phosphoric acid until 1954.

[14] Active plants as of December 31; 2 additional plants (total capacity 23,400 tons of available P_2O_5), both in the continental United States, were inactive in 1959 but were being maintained in standby condition.

[15] Alabama, 1; Florida, 8; Idaho, 2; Mississippi, 1; Missouri, 1; Utah, 1. Active plants as of July 1, except full-scale plant of Tennessee Valley Authority, Wilson Dam, Ala., for making concentrated superphosphate with superphosphoric acid, which began operation in 1960. Includes plant of Central Farmers Fertilizer Co., Georgetown, Idaho, for making concentrated superphosphate with superphosphoric acid, which began operation in July 1959.

were common adjuncts of normal superphosphate plants in the earlier days of the fertilizer industry, often because economical supplies of merchant acid were lacking or insufficient and many plants were remote from sources of such acid. Although superphosphate manufacture has become increasingly dependent on noncaptive acid, it appears that at least 50 percent of the plants had coexisting acid-making facilities until after 1941 (Table 3). The proportion was 53, 52, 45, and 42 percent in 1914, 1941, 1951, and 1959, respectively. Regionally, the 50-year trend in the Atlantic Coast States has been to higher proportions of plants making their own acid (55 percent in 1914, 70 percent in 1959), whereas the opposite trend has been especially pronounced in the South Central States (64 percent in 1914, 18 percent in 1959).

Manufacture of wet-base goods by treating mixtures of natural phosphates and nitrogenous organic substances (wool waste, fur trimmings, leather scrap, etc.) with sulfuric acid —an important operation in many normal superphosphate plants a half-century ago—was confined in 1959 to only three plants, one each in Alabama, Mississippi, and South Carolina. Rapid decrease in production of wet-base goods began around 1930, about the time solutions and anhydrous ammonia were introduced as sources of nitrogen in superphosphate fertilizers.

Small quantities of enriched superphosphate[4] have been manufactured in the United States for more than 15 years. The material was produced in six plants in 1953 and nine plants in 1954 but in only three plants (one each in Arkansas, Illinois, and Ohio) in 1959. Since enriched superphosphate can readily be made in normal superphosphate plants its manufacture has been confined to such plants, usually with noncaptive phosphoric acid.

The number of plants manufacturing concentrated superphosphate[5] in the United States gradually increased from two in 1910 to nine in 1951 and then to fourteen in 1959 (Table 2). These data generally relate only to plants which had coexisting facilities for making phosphoric acid. As discussed later, the material has also been produced with noncaptive phosphoric acid by normal superphosphate plants.

According to Mehring (**7**), the first concentrated superphosphate plant in this country was operated by the American Phosphate and Chemical Co. at Baltimore, Md., about 1890 to 1893. The next plant was operated by the Goulding Fertilizer Co. at Pensacola, Fla., about 1898 to 1901. The third plant was opened in March 1907 at Charleston, S. C., by the Virginia-Carolina Chemical Corporation, and it was closed nearly 50 years later, in May 1956. Small quantities of concentrated superphosphate were also produced by the Mountain Copper Co. at Mococo, near Martinez, Calif., around 1910 to 1912, and by the Piedmont Electro-Chemical Co. at Mount Holly, N. C., about 1914 to 1916.

Manufacture of concentrated superphosphate was started by the Anaconda Copper Mining Company at Anaconda, Mont., in 1920 and was discontinued in February 1959. Of the other eight plants initiating production in 1920 to 1940 only two are still in operation, namely, the U. S. Phosphoric Products Division, Tennessee Corporation, East Tampa, Fla., and the Tennessee Valley Authority, Wilson Dam, Ala., dating from 1924 and 1934, respectively. Since 1940, manufacture of concentrated superphosphate with captive phosphoric acid was begun by sixteen plants, four of which had ceased its production by 1959. Of the fourteen active plants on July 1, 1959, ten were opened since 1951, and eight of the fourteen were located in Florida.

Although manufacture of concentrated superphosphate has been chiefly with wet-process phosphoric acid, considerable quantities have been made with furnace-process acid. Captive electric-furnace acid was used by the Piedmont Electro-

[4] Defined as the product, containing more than 22 percent and less than 40 percent of available P_2O_5, made by treating natural phosphates directly with a mixture of sulfuric and phosphoric acids.

[5] Defined as the product, containing 40 percent or more of available P_2O_5, made by treating natural phosphates primarily with phosphoric acid. It includes the material called triple superphosphate, treble superphosphate, or double superphosphate.

Table 3.—Regional distribution of plants for manufacture of normal superphosphate (including wet-base goods) in the United States, stated years, 1914-59[1]

Region[2]	Number of plants											
	Having coexisting facilities for making sulfuric acid						Total					
	1914	1920	1930	1941[3]	1951[4]	1959[3]	1914	1920	1930	1941[3]	1951[4]	1959[3]
New England[5]	1	2	2	1	2	2	7	5	3	3	4	4
Middle Atlantic[6]	20	17	10	8	8	8	45	34	21	14	14	10
South Atlantic[7]	72	72	51	42	48	46	118	109	89	62	71	66
East North Central[8]	10	11	7	8	15	17	28	32	32	28	45	50
West North Central[9]	1	0	1	0	0	3	2	1	2	0	11	11
East South Central[10]	22	22	18	10	10	8	35	36	34	29	37	39
West South Central[11]	6	6	6	4	6	4	9	9	12	8	15	29
Mountain[12]	0	0	0	0	0	1	0	0	0	0	2	2
Pacific[13]	5[14]	4	3	3	3	3	12[14]	5	3	3	4	6
Puerto Rico	0[15]	0	0	1	1	0	0[15]	0	0	1	1	0
Total	**137**	**134**	**98**	**77**	**93**	**92**	**257[16]**	**235**	**196**	**148[17]**	**204**	**217[18]**

[1] 1914, U. S. Federal Trade Commission (**3**) except as indicated; 1920-30, "The American Fertilizer Hand Book," corrected for known errors where possible, including duplications, omissions, and discontinuances; 1941, Jacob (**4**); 1951, Adams **et al.** (**2**).

[2] The States named in footnoes 5-13 had normal superphosphate plants in one or more of the years.

[3] Active plants as of December 31.

[4] Active plants as of September 1.

[5] Maine, Massachusetts, Connecticut.

[6] New York, New Jersey, Pennsylvania, Maryland.

[7] Virginia, North Carolina, South Carolina, Georgia, Florida.

[8] Ohio, Indiana, Illinois, Michigan, Wisconsin.

[9] Minnesota, Iowa, Missouri, Nebraska, Kansas.

[10] Kentucky, Tennessee, Alabama, Mississippi.

[11] Arkansas, Louisiana, Oklahoma, Texas.

[12] Idaho, Utah.

[13] Washington, California, Hawaii.

[14] Includes Hawaii, which was omitted from the Federal Trade Commission's list.

[15] Private communication.

[16] Includes one plant (in the continental United States) without coexisting facilities for making sulfuric acid, which was not identified as to the State or region in which it was located.

[17] Seven additional plants, all in the continental United States, were inactive in 1941 but could have been operated without extensive repair and (or) purchase of new equipment.

[18] Two additional plants, both in the continental United States, were inactive in 1959 but were being maintained in standby condition.

Chemical Co.; the Federal Phosphorus Co., Anniston, Ala., 1924-25; and the Phosphate Mining Co., Nichols, Fla., 1938-45. The present users of electric-furnace acid are the Tennessee Valley Authority and the Central Farmers Fertilizer Co., Georgetown, Idaho, the latter dating from July 1959. The Victor Chemical Works, Nashville, Tenn., has been the only user of blast-furnace acid, in 1930 to 1940.

Besides its manufacture in specially designed plants with captive phosphoric acid, concentrated superphosphate is also made in a few normal superphosphate facilities with noncaptive acid, chiefly electric-furnace acid. An early production in this way, started in 1944, was by the I. P. Thomas & Son Co., Paulsboro, N. J., with spent electric-furnace acid from the manufacture of a plastic. The estimated number of such operations fluctuated irregularly from one in 1951 to a maximum of sixteen in 1955 and 1956 and then to seven in 1959.

Plant Capacities

The total capacity for manufacturing normal superphosphate (including wet-base goods) rose from 940,000 tons of available P_2O_5 in 1910 to 3,141,135 tons in 1959, an increase of 234 percent (Table 2). The capacity was nearly doubled in 1941 to 1951, and its increase during this time (1,465,000 tons) was far greater than in any other 10-year period. Plants having coexisting facilities for making sulfuric acid accounted for 51 percent of the capacity in 1951 and 47 percent in 1959.

Large changes also occurred in most of the regional capacities for normal superphosphate in 1941 to 1959, the only period for which such data are available (Table 4). Especially noteworthy were the progressive increases in the East North Central (553,000 tons), West South Central (350,000 tons), and East South Central (282,000 tons) regions and in the West North Central region (130,000 tons) which had no superphosphate plants in 1941. The capacity in the South Atlantic region rose from 585,000 tons in 1941 to 1,010,000 tons in 1951 and then fell to 866,000 tons in 1959 for a net gain of 281,000 tons. The Middle Atlantic region was the only area showing a progressive decrease in capacity, 70,000 tons in 1941 to 1959. The South Atlantic and Middle Atlantic regions, respectively, had much smaller portions of the total capacity in 1959 (28 and 9 percent) than in 1941 (39 and 24 pecent), while the respective portions in the East North Central, West South Central, and West North Central regions increased greatly—25, 14, and 4 percent in 1959 as compared with 15, 5, and 0 percent in 1941.

Among the individual States, Maryland had the largest portion (15.5 percent) of the total productive capacity for normal superphosphate in 1941, followed by Georgia (13.5 percent), Ohio (8.6 percent), South Carolina (7.4 percent), Virginia (7.0 percent), Alabama (6.5 percent), and North Carolina (6.3 percent). The other States each had less than 5 percent of the capacity. States each having at least 5 percent of the total capacity in 1959 were Georgia (9.6 percent), Illinois (8.5 percent), Ohio (7.7 percent), Virginia (6.3 percent), Maryland (6.1 percent), and Texas (5.3 percent).

Baltimore has long been the Nation's leading center for manufacture of normal superphosphate. It had 7.0 percent of the total capacity in 1951 and 6.1 percent in 1959. Six other urban areas each had at least 2 percent of the 1959 capacity—Norfolk 4.3, East St. Louis-National Stock Yards 3.4, Savannah 2.8, Indianapolis 2.8, Cincinnati-Lockland 2.2, and Nashville 2.1 percent. Of the 156 localities having plants in 1959, these seven accounted for 23.7 percent of the capacity.

Although the data are not on an uniform basis of plant operation (hours per day and year) from year to year, the trend in normal superphosphate has undoubtedly been markedly to larger capacities in the individual plants during the last 40 years at least. Thus the average annual capacity per plant was approximately 6,000 tons of available P_2O_5 in 1920, 8,000 tons in 1930, 10,000 tons in 1941, and 14,500 tons in 1951 and 1959 (Table 2). In 1959 the average capacity in the Middle Atlantic region (28,700 tons of available P_2O_5) was much higher than that in the other regions, which ranged from 11,800 tons (West North Central) to 15,500 tons (East North Central). The dominant position of the Middle Atlantic region reflects the very high average capacity (38,200 tons) of the five Baltimore plants, which included the Nation's three largest facilities.

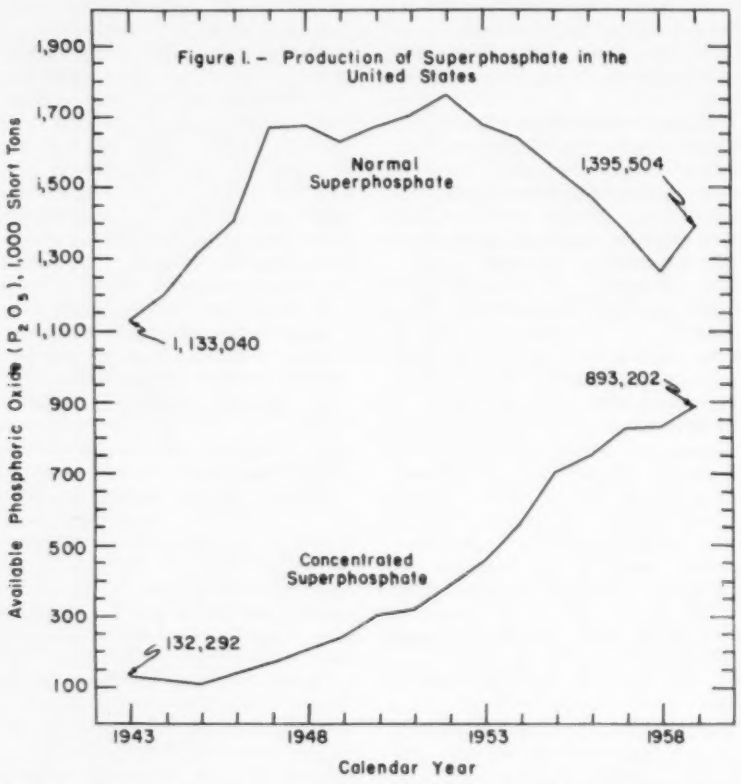
The total annual capacity for making concentrated superphosphate gradually increased from 3,000 tons of available P_2O_5 in 1910 to 180,000 tons in 1940 (Table 2). It nearly doubled in the next 11 years and then mounted to 1,068,420 tons in 1959. Rising from 1,500 tons in 1910 to 76,300 tons in 1959, the average capacity per plant approximately doubled in each successive decade. The capacities in 1930 and 1940 were distributed fairly evenly among plants using phosphate rock from the Florida, Tennessee, and Western deposits, respectively, but since World War II an increasingly large portion has been in facilities using

Table 4.—Regional distribution of annual capacity for manufacture of normal superphosphate (including wet-base goods) in the United States, 1941, 1951, 1959[1]

Region[2]	Available P_2O_5, short tons		
	1941[3]	1951[4]	1959[3]
New England[5]	38,496	53,910	53,910
Middle Atlantic	357,568	349,422	287,100
South Atlantic	585,008	1,009,807	866,070
East North Central	223,104[6]	693,868	775,854
West North Central	0	114,696	130,320
East South Central	210,160	418,131	491,697
West South Central	76,848	237,420	426,762
Mountain	0	[7]	[7]
Pacific[8]	[9]	104,940[10]	109,422[10]
Total[11]	**1,517,280[12]**	**2,982,194**	**3,141,135[13]**

[1] 1941, Jacob (**4**); 1951, Adams **et al.** (**2**). The data are not on an uniform basis of plant operation (hours per day and year) from year to year (see papers cited); the capacities in 1959 are based on operation for 16 hours per day and 300 days per year, with adequate capacities for off-season storage of the superphosphate.
[2] See Table 3, footnotes 2 and 6-13.
[3] Active plants as of December 31.
[4] Active plants as of September 1.
[5] The plants were in Maine and Massachusetts only.
[6] Except Michigan, which is included in total for United States.
[7] Included in Pacific region.
[8] Includes Hawaii in 1951 and 1959 but not in 1941.
[9] Included in total for United States.
[10] Includes Mountain region.
[11] Excludes the plant in Puerto Rico, which was operated in 1941 and 1951 but not in 1959.
[12] Seven additional plants (total capacity 42,480 tons of available P_2O_5), all in the continental United States, were inactive in 1941 but could have been operated without extensive repair and (or) purchase of new equipment.
[13] Two additional plants (total capacity 23,400 tons of available P_2O_5), both in the continental United States, were inactive in 1959 but were being maintained in standby condition.

Superphosphate Production in the United States



Florida rock. Such facilities, eight of which were located in Florida, accounted for at least 80 percent of the capacity in 1959.

Continually mounting labor, handling, and transportation costs per unit of P_2O_5 and the growing demand for higher analysis fertilizers were important factors in the phenomenal expansion of the concentrated superphosphate capacity after World War II, because they have increasingly tended to favor the economy of this material in comparison with that of normal superphosphate. Thus, since 1951 the capacity for manufacturing concentrated superphosphate has been increased by about 712,000 tons of available P_2O_5, in contrast to only 159,000 tons for the normal product. Concentrated superphosphate accounted for less than 0.5 percent of the total productive capacity for available P_2O_5 in all superphosphate materials in 1910 and 1920. The proportion rose to 2.7 percent in 1930 and then to 10.7 and 25.4 percent in 1951 and 1959, respectively.

Table 5.—Production of normal and concentrated superphosphates in the United States, stated years 1910-59

Calendar year	Superphosphate, short tons	
	Normal[1]	Concentrated[2]
1910	2,560,000	6,177
1920	4,933,000	15,256
1925	4,342,000	36,599
1930	4,084,529	95,198
1935	2,625,894	91,059
1940	3,898,640	329,046
1945	7,372,104	250,960
1950	9,296,051	686,855
1955	8,656,172	1,570,187
1959	7,752,800	1,984,893

[1] 1910-50, Mehring **et al. (8, p. 62)**; 1955-59, U. S. Bureau of the Census, includes enriched superphosphate; 1930-59, excludes Territories, 18-percent available P_2O_5 basis.
[2] 1910-40, Mehring **(7)**; 1945-59, U. S. Bureau of the Census, 45-percent available P_2O_5 basis.

Production Trends

Table 5 gives the tonnages of normal and concentrated superphosphates produced annually at intervals over the last 50 years, and Figure 1 shows the annual productions as available P_2O_5 in 1943 to 1959.

The upward trend in production of normal superphosphate was sharply reversed during the depression of the 1930's, a setback which was not fully overcome until 1941. Under the impetus of war and postwar demands the output then rose progressively to an alltime record of some 9,800,000 tons of material (basis 18 percent aavilable P_2O_5) in 1952. In later years, however, the trend has again been downward, owing to steadily growing competition from higher analysis phosphates, especially concentrated superphosphate.

Regional trends in normal superphosphate production have tended generally to follow the national pattern from year to year, at least since 1940 (Table 6). The South Atlantic region, an area which historically has relied mostly on normal superphosphate for its fertilizer phosphorus, has continued to lead the field, accounting for 32.5 percent of the national production in 1940 and 35.4 percent in 1959. The North Central and South Central regions each supplied about 17 percent of the production in 1940, as compared with 24.4 and 20.7 percent, respectively, in 1959. Although the Middle Atlantic region ranked second (31.4 percent) in 1940, its share was probably no more than 15 percent in 1959.

Since the operation of normal superphosphate plants is commonly on a seasonal discontinuous basis the annual production is usually well below the productive capacity. Thus in the last 50 years the relation between the total production and the capacity in or near the final year of each decade has ranged from 44.4 percent in 1959 to about 62 percent in 1920. It was around 47 percent in 1940 and 59 percent in 1950. The relation may vary widely in the different regions. In 1959, for example, the production in the West South Central region was only 21.1 percent of the area's capacity, as compared with 58.7 and 57.1 percent for the New England and South Atlantic regions, respectively. The proportion was even higher (about 71 percent) in the Middle Atlantic States.

Compared to normal superphosphate the production of concentrated superphosphate was at a very low level (6,177 tons of material) in 1910. Following its gradual increase to 95,198 tons in 1930, the production was sharply curtailed in the earlier depression years of the thirties—only 24,192 tons in 1932. Under the stimulus of the programs of the Agricultural Adjustment Agency and the Tennessee Valley Authority, however, the recovery was rapid, and successive production records were set in 1936 to 1940. Wartime conditions adversely affected the production in 1941 to 1946, but the output climbed to new levels in each of the following years and reached nearly 2,000,000 tons in 1959.

Unlike normal superphosphate, the concentrated material is commonly made in plants operated con-

tinuously over most of the year, and the annual production, therefore, is usually much closer to the productive capacity. Neglecting the relatively small quantities of concentrated superphosphate manufactured with noncaptive phosphoric acid, the relation between production and productive capacity (83.6 percent in 1959) ranged from about 82 percent in 1940 to more than 97 percent in 1920, 1930, and 1950.

Regarding the annual total production of available P_2O_5 as normal and concentrated superphosphates before 1952, the highest proportion supplied by the concentrated material was about 17.5 percent in 1940. Beginning in 1952, however, the proportion (39.0 percent in 1959) rose from 18.0 percent in that year to 39.7 percent in 1958, with the setting of new records annually.

Progress in Manufacture and Technology

Major advances in the manufacture and technology of superphosphates have been made in the last half-century. These have included important changes in plant design, construction, and equipment, significant developments in processes and techniques, and great improvement in the chemical and physical characteristics of the products. Since much of the progress has been recounted in several recent publications (**5, 9, 10, 11, 12**) the following discussion will be limited to brief summaries of some of its phases.

In 1910 much normal superphosphate was still being made with the so-called open-dump system, especially in the South, whereby the freshly mixed batch of rock and acid was discharged into an automatic dump car for transfer to an open pile in the dump shed (**13, 14, 15**). Although progressively less use was made of this system, which provided no means for preventing escape of the noxious fluorine-bearing fumes to the atmosphere, a modification, employing an open-top den, was operated by at least one plant, at Savannah, Ga., until 1946.

Abatement of the fume nuisance —thus reducing atmospheric pollution, promoting better working conditions in the plant, and permitting recovery of commercially valuable fluorine compounds—was a major factor in the adoption of the closed-den system. As this system gradually superseded the open-dump method, increasing attention was given to the use of mechanical devices in the excavation of superphosphate dens, a dangerous and disagreeable task requiring much labor for its manual performance. Among such devices were power shovels, draglines, overhead cranes, and especially designed equipment, including completely mechanized den systems.

It appears that the first mechanical den to be used successfully in the United States was the Svenska system, which was introduced from Sweden and was installed in 1911 at the Carteret, N. J., plant of Armour Fertilizer Works. Installations of this system—used only by Armour — were made at seven additional plants, all before 1921, and it was still in operation at three plants in 1959.

The first installation of the Sturtevant mechanical den, originally an English development, was made in May 1922 at the Columbus, Ga., plant of the Armour Fertilizer Works. This den—which, like the Svenska apparatus, is fed by a batch mixer and is alternately filled and emptied—is the country's most widely used mechanical den for manufacture of normal superphosphate. It has been installed in approximately 100 plants, nearly all of which are currently in operation.

The Forbis den, also fed by a batch mixer, appears to have been the first continuous den used in this country. It was installed by the Morris Fertilizer Co. at Navassa, N. C., in 1920 and at three additional plants, operated by three other companies, in 1921 to 1926. Three of these dens, including the Navassa installation, were still in operation in 1959.

The Broadfield system was the first American development, and apparently the first in the world, to successfully combine continuous mixing of the rock and acid with continuous denning of the product. First installed in 1929 and still used at the plant of the Georgia Fertilizer Co., Valdosta, Ga., the system has gained world-wide application in the manufacture of both normal and concentrated superphosphate, with about 20 installations in the United States alone.

Other domestic developments in continuous acidulation and denning, similar in principle to the Broadfield system, were the Sackett (**16**) and Davidson-Kennedy (**17**) systems. The first Sackett installation—Central Chemical Corporation, Hagerstown, Md., in 1943—was followed by five others, one of the latest being at the plant of the Davison Chemical Co., Baltimore, the country's largest normal superphosphate facility. The Davidson-Kennedy system, first operated in January 1956 by Anthony Chemicals, Inc., Opelousas, La., has been installed at three plants.

The Oberphos process (**18, 19**)—an unique system, involving batch reaction of the rock and acid in an autoclave at elevated temperature and pressure—was developed by the G. Ober & Sons Co., Baltimore, in the 1920's and was operated by that company from 1929-30 to 1935. A few installations were also made in Canada and England. Advantages claimed for the process included conservation of acid and production

Table 6.—Regional production of normal superphosphate in the United States, calendar years 1940, 1950, 1959[1]

Region[2]	Available P_2O_5, short tons		
	1940	1950	1959
New England[3]	12,675	25,025	31,663
Middle Atlantic	227,526	338,581	147,548[4]
South Atlantic	235,470	538,478	494,639
East North Central	111,064[5]	382,779	285,016
West North Central	0	57,430	55,791
East South Central	96,959	214,565	198,734
West South Central	30,420	130,246	90,044
Mountain	0	([6])	([6])
Pacific	([6])		
Mountain		([6])	([6])
Undistributed	10,336[7]	33,246[8]	92,069[9]
Total	**724,450**	**1,720,350[10]**	**1,395,504**

[1] 1940, Jacob (**4**); 1950, Adams **et al.** (**2**); 1959, U. S. Bureau of the Census. Excludes Hawaii and Puerto Rico. Includes wet-base goods in 1940 and 1950 and enriched superphosphate in 1959.

[2] The States named in Table 3, footnotes 6-13, had productions of normal superphosphate in one or more of the years.

[3] The productions were in Maine and Massachusetts only.

[4] Maryland only; New York, New Jersey, and Pennsylvania are included in undistributed.

[5] Except Michigan, which is included in undistributed.

[6] Included in undistributed.

[7] Michigan and California.

[8] Idaho, Utah, Washington, and California.

[9] New York, New Jersey, Pennsylvania, Utah, Washington, and California.

[10] Includes 11,624 tons of P_2O_5 as wet-base goods.

of a superphosphate having improved physical qualities, including a high proportion of coarse particles. Although the process gained only limited use it undoubtedly stimulated interest in the production of granular superphosphate.

Beginning with the Broadfield process, increasing use has been made of continuous methods for mixing the rock and acid. A major advance was the development of the cone mixer, which has no moving parts and is now extensively used in concentrated and normal superphosphate plants in conjunction with both batch and continuous den systems. This type of mixer was first employed, in 1941, by the Tennessee Valley Authority, Wilson Dam, Ala., in the manufacture of concentrated superphosphate (**20, 21**). Its first commercial application in production of normal superphosphate appears to have ben in 1953 by the Bunkie Phosphate Co., Bunkie, La. (**22**).

Fifty years ago, normal superphosphate was generally low in available P_2O_5 and high in moisture and free acid and was plagued with poor physical condition. The material marketed in 1910 averaged about 15.7 percent available P_2O_5 and 10.5 percent moisture. By 1950, however, the average P_2O_5 content had risen to near its present level of about 20 percent, and the moisture content had decreased to about 5 percent. This progress resulted from the use of stronger sulfuric acid under more carefully controlled conditions and of higher quality phosphate rock ground to a greater degree of fineness, together with process improvements and sometimes blending with small additions of concentrated superphosphate to raise the grade of the product.

The concentration of the acid as used in 1910 ranged from about 50° to 55° B. at 60° F. and may have averaged less than 52° B. The present average is much higher, probably more than 56° B. During this time the fineness to which the phosphate rock was ground for manufacture of normal superphosphate increased from about 80-95 percent through the 60-mesh sieve to 75-95 percent through the 100-mesh sieve, thus favoring a reduction in the acid required for efficient conversion of the phosphorus to available forms.

The physical condition and the handling and storage characteristics of the marketed normal superphosphate usually improved as its content of moisture and free acid was reduced, and further improvement was often effected by small additions of conditioning agents or by reducing the proportion of very fine particles. Even so, the material was prone to cake after leaving the factory and was often difficult to distribute uniformly in the field, troubles which were substantially overcome by the introduction of granular products. Such products may be prepared by either screening run-of-pile superphosphate or by subjecting it to granulation treatments with appropriate sizing of the particles. One of the first commercial productions in the latter way—initiated by the Davison Chemical Corporation at Curtis Bay, Baltimore, about 1935—involved processing preconditioned run-of-pile superphosphate in a rotary granulator-dryer (**23**).

In the manufacture of concentrated superphosphate with wet-process phosphoric acid, it formerly was the common practice to use acid containing about 40 to 45 percent P_2O_5 and to artificially dry the cured product. Recently, however, the trend has been sharply to the use of stronger acid (usually about 50 to 55 percent or more of P_2O_5), and in some plants the operations are conducted in such manner that at least a portion of the output is produced directly in dry, granulated form. Since 1950 the batch system has been generally replaced by continuous mixing and denning, with economies in manufacturing costs.

The Meyers process, an unique method for making concentrated superphosphate with weak wet-process acid (about 25 percent P_2O_5), was developed by the Armour Fertilizer Works and placed in commercial operation at Siglo, near Columbia, Tenn., in July 1929. The process involves concentration in a rotary kiln of a previously agitated slurry of the acid and ground rock, with subsequent pit-denning and artificial drying of the product. The Siglo plant was closed in December 1951. Operation of the process has been continued, however, at Armour's Bartow, Fla., plant, opened in February 1949.

Large-scale manufacture of concentrated superphosphate with high-strength phosphoric acid was first done in 1934, by the Tennessee Valley Authority at Wilson Dam, Ala. (**24**). The Authority's procedure involved the use of electric-furnace acid containing about 57 percent P_2O_5 to produce a pile-cured material which did not require artificial drying. Furnace and wet-process acids of approximately this concentration have also been used in a similar manner by other plants.

The most recent development in manufacture of concentrated superphosphate features the use of so-called superphosphoric acid (**25, 26**). This acid, made from elemental phosphorus, contains about 76 percent P_2O_5 and consists of approximately equal proportions of ortho- and pyrophosphoric acids. The superphosphate, consisting mainly of anhydrous monocalcium phosphate, contains about 54 percent available P_2O_5 and 1 percent moisture. Following its initial production on a demonstration scale in 1957, by the Tennessee Valley Authority, large-scale manufacture of the material was started in 1959, by the Central Farmers Fertilizer Co., Georgetown, Idaho.

Acknowledgment

Grateful acknowledgment is made to the many people who supplied information on the status of superphosphate facilities, especially in 1959, and on other phases of the industry.

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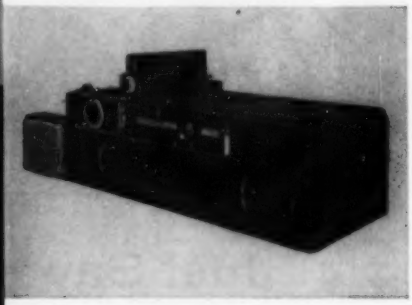

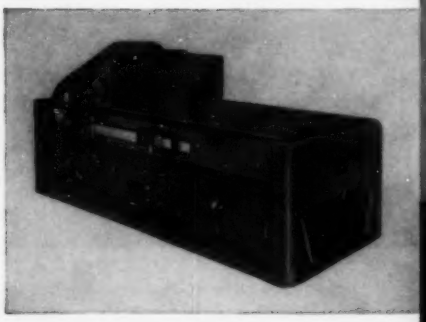

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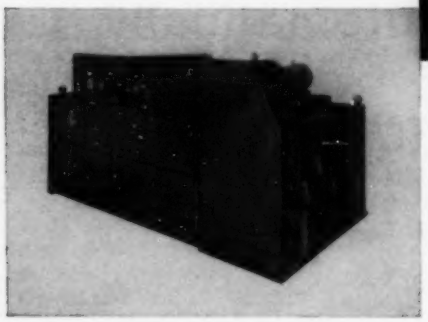

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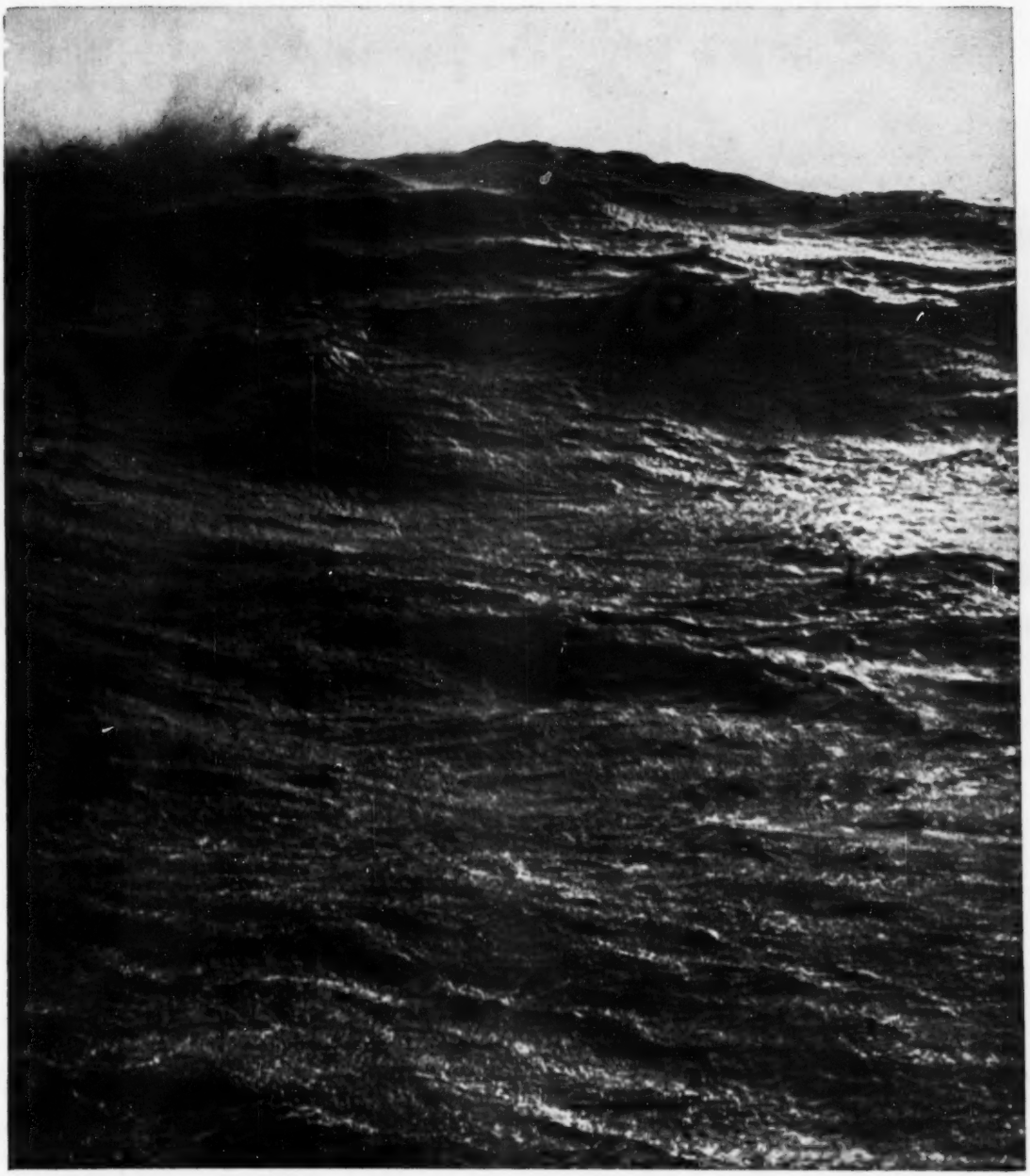

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This is the second in a series of articles covering various aspects of the fertilizer dealer-farmer survey made by the authors

the role of

The Fertilizer Dealer in Fertilizer Sales and Use

by George M. Beal, Joe M. Bohlen *and* Larry Campbell

Farmers appear to expect their fertilizer dealers to be more than fertilizer peddlers. And, it also appears that farmers are willing to pay the dealer well to perform the role they expect of him—that of a fertilizer consultant—either by buying from this dealer in preference to other dealers, or by being willing to pay a somewhat higher price for their fertilizer in order to receive the benefit of this dealer's information.

These are some of the findings indicated by an Iowa study conducted by Iowa State University in cooperation with the Tennessee Valley Authority. The findings reported here come from three major studies: (1) a state-wide random sample study of 118 Iowa retail fertilizer dealers during the spring of 1958; (2) a study of 120 Iowa farmers located in the southeastern quarter of Iowa during the spring of 1957; and, (3) a 1958 study of a state-wide random sample of 315 Iowa farmers. Some information about the nature of the farmers is included in this article about dealer roles. These data are included because it is necessary to know the farmer's needs and expectations of the fertilizer dealer in order to understand the significance of the dealer's role in fertilizer marketing.

The 120 farmer study not only showed that the farmers expect their fertilizer dealer to know the answers to their fertilization problems; they also expect him to make fertilizer use **recommendations** to them. For example:

1. 97 percent of the farmers said they thought their fertilizer dealer should be a reliable source of information about fertilizer.

2. 79 percent of these farmers said they expected their fertilizer dealer to recommend to them the method by which they should apply the fertilizer.

3. 60 percent of them said they expected their fertilizer dealer to recommend to them the amount of fertilizer to apply.

4. 69 percent of them said they thought their dealer should recommend the analysis of fertilizer for them to use.

This does not mean that the dealer is the only one who should play this role—but he is one of the important sources.

The 120 farmers were also asked to complete a sentence beginning, "I wish my fertilizer dealer would . . ." Those farmers using fertilizer responded:

1. reduce his prices, 26 percent.
2. give me more information, 18 percent.
3. sponsor test plots and demonstrations, 9 percent.
4. offer more services, 9 percent.
5. he's doing OK, 16 percent.
6. no answer and various other answers, 22 percent.

Thus, while 26 percent of the farmers mentioned price reduction, the answer that might be expected, the 18 percent who requested more information and the nine percent mentioning the sponsoring of test plots and demonstrations combine to make a total of 27 percent. Thus, 27 percent desired more information as compared to the 26 percent desiring reduced prices. In addition nine percent wanted additional services.

This reliance on fertilizer dealers for fertilizer information seems to stem from the fact that the farmers' knowledge about fertilizer is, in general, inadequate. In the statewide farmer study, for example, it was found that the average farmer could answer correctly only 4.9 of 11 multiple choice questions used to measure their knowledge about fertilizer and its use. These questions were not highly technical. Rather, they were simple questions used to determine if the farmer had the minimum knowledge necessary for the proper use of fertilizer. Less than one percent of the farmers answered all of the questions correctly and 20

Data in this paper are from Iowa State University Experiment Station Project No. 1352 done in cooperation with the Agricultural Economics Branch, Division of Agricultural Relations, Tennessee Valley Authority. The project is under the co-leadership of George M. Beal and Joe M. Bohlen, professors of rural sociology, Department of Economics and Sociology, Iowa State University. Data are taken from three phases of Project No. 1352. These phases were under the leadership and supervision of assistant professor John Harp, and graduate assistants Larry Campbell and Quentin Jenkins. They were assisted by graduate assistant research team members Larry Kasperbauer, Daryl Hobbs, Richard Warren, Ron Powers and Spencer Hildahl.

percent of the farmers got no more of the questions right than they would have if they had guessed at the answers.

From this it appears that the farmer does need much information about fertilizer and fertilizer use. And, while he certainly will get much of this information from other sources, the findings suggest that he relies heavily on the fertilizer dealer.

If farmers not only need fertilizer information, but expect their fertilizer dealers to provide them with this information, then it would be expected that the dealers who perform this service would have relatively more success in selling fertilizer. Such appears to be the case.

There appear to be three major reasons why dealers who provide farmers with fertilizer information tend to be successful in their fertilizer retailing programs. The first—that of farmers expecting it of their fertilizer dealers—has already been presented. However, the effectiveness of this factor in turn seems to be dependent upon two other factors.

First, it appears that farmers want information about fertilizer so that they will obtain optimum returns on their fertilizer investments. That is, they want to be certain that they're using the fertilizer in the best possible way.

Secondly, education by the dealers should reasonably lead to higher levels of fertilizer use, which in turn should lead to greater fertilizer sales for the dealer. There appears to be considerable room for increased farmer use of fertilizer in the present price-cost relationship situation. For example, in the statewide study of farmers it was found that:

1. the average fertilizer expenditure of **all** Iowa farmers in 1957 was $303.

2. 12 percent of the farmers had never used fertilizer.

3. 10 percent of the farmers had used fertilizer in the past but didn't use it in 1957 so that a total of almost a fourth (22 percent) of Iowa's farmers did not use fertilizer in 1957.

4. the average fertilizer expenditure of Iowa farmers **using fertilizer in 1957** was $410. Yet these farmers were farming an average of 230 acres. If the average farmer at the time of this study had about one-third of his land in row crops and was using fertilizer on row crops only, this would result in an average fertilizer expenditure of not quite $5 per acre. Under average conditions, this is certainly below optimum levels of use. And it should also be remembered that another 22 percent of the farmers used no fertilizer in 1957.

It seems apparent that a dealer role of a fertilizer consultant is consistent with the needs and expectations of farmers. Three major indices were used to determine the extent to which the dealer saw himself in the consultant role and was capable of and was performing this role. These measures were then related to the dealer's fertilizer sales volume and fertilizer gross profit.

A series of questions, forming a continuum ranging from the dealer perceiving that his customers expected him to be a consultant (44 percent) through being just a seller of needed goods and services (42 percent), to the dealer perceiving that his customers only expected him to be a "friend of the farmer" were asked of the dealers. The dealers who thought they should be a consultant on fertilizer had this advantage over the dealers who thought their customers expected them only to be a friend of the farmer:

1. the former's average fertilizer sales volume was $86,876 as compared to an average of $22,293 for the friend of the farmer. The average for all dealers was about $45,600, and ranged from $500 to $330,000.

2. his average fertilizer gross profit was $5,280 as compared to the friend of the farmer's average of $2,970. The average for all dealers was approximately $4,000, and ranged from $110 to $39,600.

3. his average fertilizer mark-up was 10.7 percent as compared with the 6.9 percent average of the friend of the farmer. The all-dealer average was 9.3 percent, and ranged from 1 percent to 35 percent.

The percent who saw themselves as "sellers of needed goods and services," in general, fell between these two groups on the volume, profit and mark-up comparisons.

However, for the dealer to act as a consultant on fertilizer matters, it is necessary for two other conditions to exist: (1) he must feel that he should fulfill this role, that is, to actively consult with farmers and make recommendations; and, (2) he must have adequate fertilizer knowledge.

The dealers were asked if they felt that they should make **recommendations** about amounts, analyses and spreading methods in selling fertilizer.

Those dealers who said they should and do attempted to influence the farmers' decisions about the amount of fertilizer to apply, the analysis to apply, and the method of application, as compared with those dealers who said they did not attempt to influence their customers' decisions about these things, had:

1. average fertilizer mark-ups of 9.5 percent as compared with average fertilizer mark-ups of 8.2 percent for those who did not attempt to influence their customers.

2. total fertilizer sales volumes averaging $56,975 as compared with an average of $19,362 for those who did not try to influence their customers.

3. fertilizer gross profits averaging $4,970 as compared with an average of $1,840 for those who did not attempt to influence their customers' decisions.

The dealers were also asked a series of questions designed to measure their knowledge about fertilizer. The group of dealers obtaining the highest score on this fertilizer knowledge test had an average fertilizer sales volume of $226,400 as compared with an average sales volume of $31,470 for the dealers obtaining the lowest score on the knowledge test.

In summary, three major points seem outstanding in the area of the dealer's role as it applies to fertilizer sales:

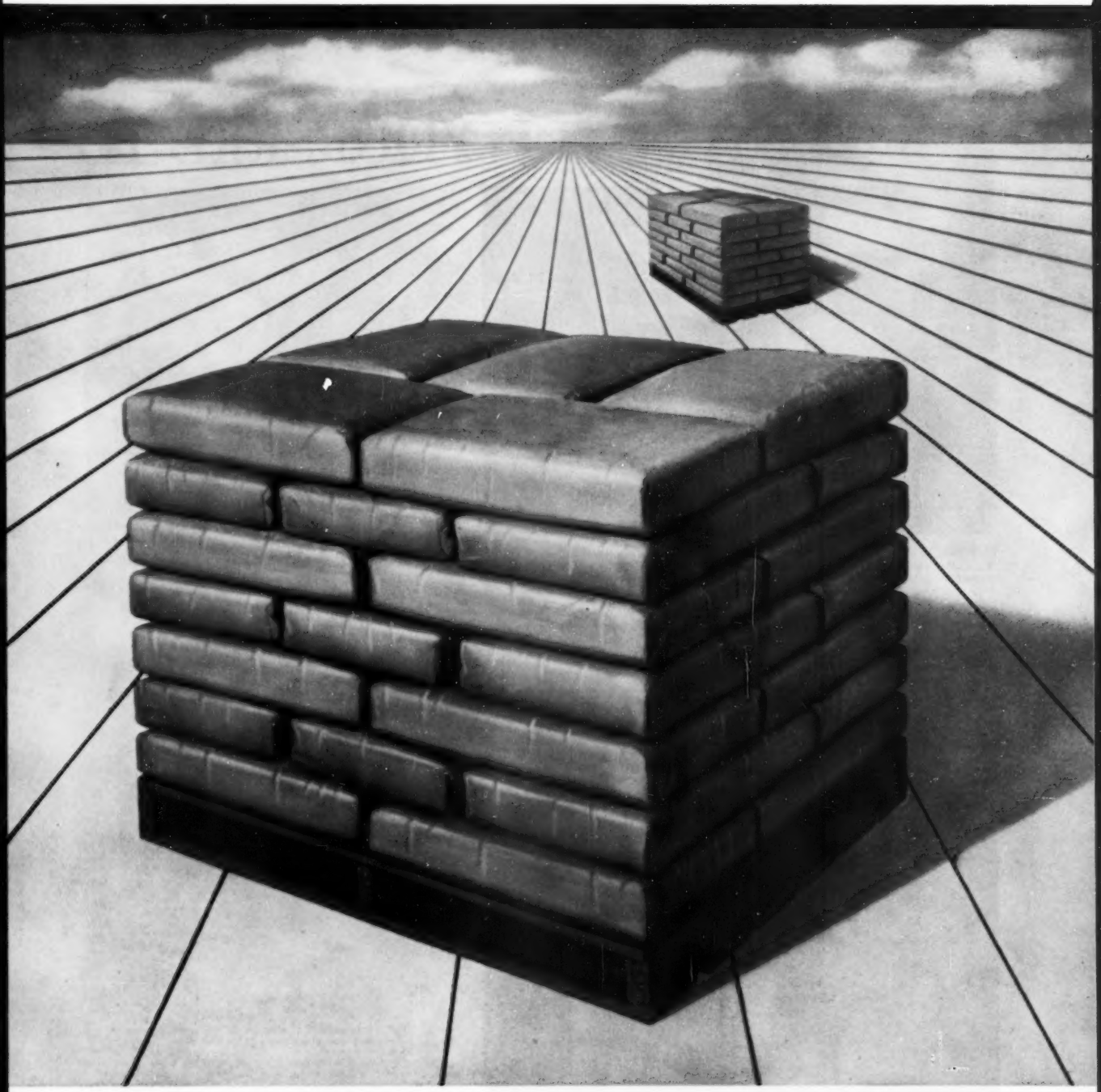
1. Farmers have a generally low level of knowledge about fertilizer and its use. This low level of knowledge tends to relate strongly to low levels of fertilizer use.

2. The farmers feel that their fertilizer dealer should not only be a reliable source of information about fertilizer, but should also make recommendations about fertilizer and its use to them.

3. Dealers who do have adequate knowledge about fertilizer and who feel that they should be fertilizer consultants and that they should make recommendations to farmers about fertilizer use tend to have higher fertilizer sales, are able to maintain higher markups, and have greater fertilizer gross profits.

Additional information on how the more successful dealers carry out their consulting and service roles will be presented in subsequent articles.

Next month's article will cover another phase of the dealer's role in fertilizer sales



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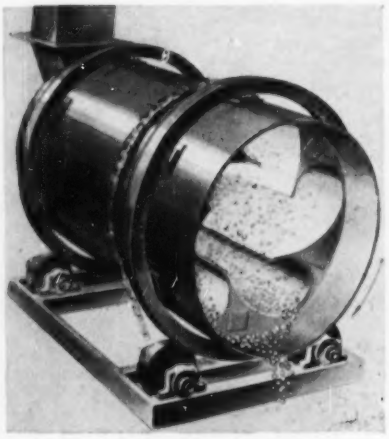

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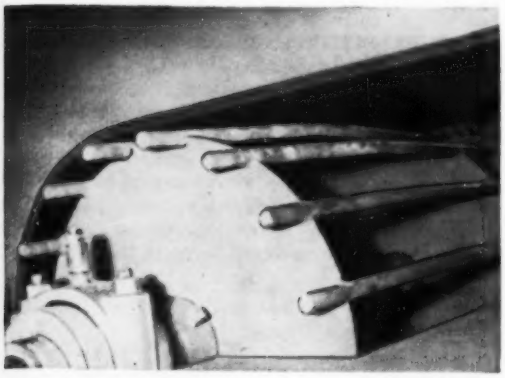

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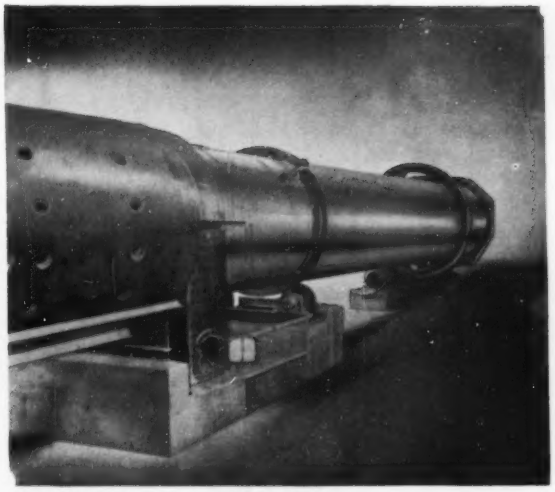

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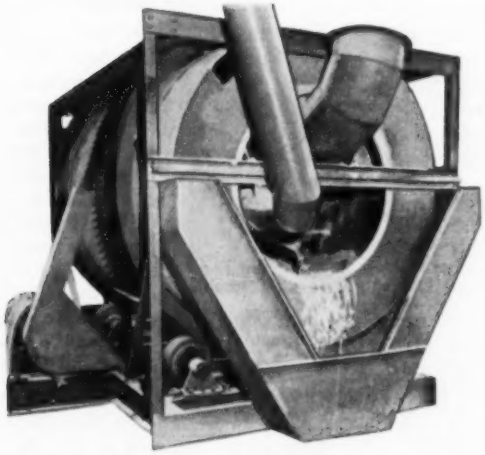

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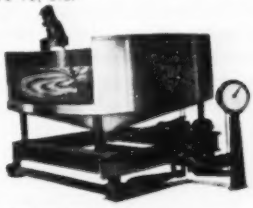

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PEOPLE in the

AAC

Agrico sales manager R. L. Waring, Jr., has announced the following recent changes in Agrico's field sales force:

At Knoxville, Tennessee, former assistant manager, A. B. Crawley becomes manager. New assistant manager, under Mr. Crawley, is B. J. Farmer, Jr., previously a field salesman at Knoxville.

G. H. Walker, former assistant manager at Cleveland, Ohio, was named manager at Danville, Ill.

Crawley

Walker

C. E. Murray has been named assistant manager at North Weymouth, Massachusetts. Mr. Murray will work with North Weymouth Manager B. E. Thorne.

Murray

Farmer

J. R. Boling has been named chief chemist at the company laboratory of Agrico at Danville, Ill., it has been announced by R. M. Ludwig, director of the company's chemical control department. Mr. Boling was formerly assistant chief chemist at Cleveland, Ohio.

Three promotions of production personnel have been announced by R. M. Richey, general superintendent for The American Agricultural Chemical Company.

J. J. Repko has been named superintendent of production at Buffalo, N. Y. He was formerly assistant superintendent there.

Paul J. Iten has been named assistant superintendent of production at Buffalo. He was formerly assistant superintendent at Danville, Ill.

James W. Ryan, formerly general foreman at the Company's Cairo, Ohio, plant, becomes assistant superintendent of production at Detroit, Mich.

Harold L. Ward has joined AAC to specialize in market research and development under Dr. G. H. Benham, director of research.

V-C

Curtis A. Cox, general manager of fertilizer manufacturing at Virginia - Carolina Chemical Corporation, today was elected a vice president of the firm.

Cox

The action, taken August 8 at a regular meeting of V-C's Board of Directors gives the company six vice presidents in addition to executive vice president Charles T. Harding. Mr. Cox has been with V-C 24 years.

He was chairman of the fertilizer section of the Southern Safety Conference in 1953 and served in the same caapcity for the National Safety Conference in 1954.

Virginia-Carolina Chemical Corporation sent four of its fertilizer sales managers and eight salesmen on a week-long cruise through Eastern Canada late last month.

The 12 men are the winners of a sales contest the company held this year for its sales force.

The winning sales managers are J. S. Polk, Baltimore, Md.; G. L. Harvin, Columbia, S. C.; J. R. Campbell, Shreveport, La.; and W. J. Bryan, Orrville, Ohio.

The salesmen and the V-C district offices from which they work are: L. H. Morrison, Baltimore, Md.; J. R. Smalley, Rochester, N. Y.; N. H. Trammell, Albany, Ga.; L. W. Adams, Orlando, Fla.; T. B. Buford and C. O. Kirk, Memphis, Tenn.; S. K. Thomsen, Estherville, Iowa; and C. E. Leonard, Cincinnati, Ohio.

The cruise on the S. S. Richelieu started at Montreal and went up the St. Lawrence and Saguenay Rivers. They spent a day and a night in Quebec.

Illinois Extension

Dr. John B. (Jack) Claar became associate director of the University of Illinois Agricultural Extension Service on September 1.

He formerly was administrative field representative for the Federal Extension Service, USDA, Washington, D. C.

The new associate director assumes the duties of Dr. William G. Kammlade, who served in that post from 1949 until his retirement August 31.

TVA

Dr. Lewis B. Nelson has been named manager of the recently created Office of Agricultural and Chemical Department of the Tennessee Valley Authority His appointment was effective September 1.

Dr. Nelson was formerly chief of Eastern Area Soil and Water Management Research in the Agricultural Research Service, USDA, in Beltsville, Md.

Prior to joining USDA in 1949, Dr Nelson did research in soil fertility at the University of Wisconsin. Previously he served as supervising chemist and technical agricultural representative for the U. S. Rubber Co. and research associate professor at Iowa State University for five years.

American Potash

John R. Jones has been named New York-New England district sales manager for American Potash & Chemical Corporation it was announced by Dr. A. J. Dirksen, general sales manager, eastern.

Jones

Mr. Jones will continue to headquarter out of the firm's eastern general sales offices in New York.

Armour

William H. Cover has been appointed midwestern area sales manager of the Armour Agricultural Chemical Company in Atlanta, it has been announced by H. Vise Miller, company vice president and general manager of its fertilizer division.

Mr. Cover, formerly Armour's division manager in Jeffersonville, Indiana, will be succeeded by Paul N. Parks, Mr. Miller also announced. Mr. Parks has been assistant manager of the firm's Cincinnati division since 1959. Mr. Cover joined Armour in 1947. Mr. Parks joined them in 1950.

George W. Leyhe retired August 27 as transportation manager of Armour. He joined them in 1922, and had been transportation manager since 1933.

Mr. Leyhe was honored at a testimonial dinner August 17.

INDUSTRY

Nitrogen Division

The appointment of Norman E. Hathaway as executive vice president of Allied Chemical's Nitrogen Division, was announced by Jacob White, president of Nitrogen Division.

Mr. Hathaway has been assistant to the president of Nitrogen Division since January 1, 1960. Prior to joining Allied Chemical, he was vice president of Oronite Chemical, a subsidiary of Standard Oil of California.

Phillips

L. H. Wright, assistant sales manager, has been placed in charge of the administrative supervision of LP-Gas and fertilizer sales by Phillips Petroleum Company. R. S. McConnell has been promoted to manager of fertilizer sales.

Mr. Wright has been with Phillips since 1930, and was appointed as manager of fertilizer sales since 1949. Mr. McConnell joined them in 1946, and for the past five years has been coordinator of fertilizer sales. He previously was assistant division manager in Wichita, in charge of fertilizer sales.

Smith-Douglass

M. W. Mawhinney, manager of the Smith-Douglass Streator, Ill., plant, has announced the appointment of Laramie J. Clark as sales representative in central Illinois.

Mr. Clark, a native of Illinois and an agricultural graduate of the University of Illinois, will live in Lincoln and serve Smith-Douglass dealers through central Illinois.

Freeport

Thomas R. Vaughan has been elected vice president and general counsel and John C. Carrington, vice president of sales by the board of directors of Freeport Sulphur Company, Charles A. Wight, president, has announced.

Carrington

Mr. Vaughan joined Freeport's legal department in 1942. Mr. Carrington joined the company in 1939.

PCA

Potash Company of America has announced appointment of Lavoid Holloway as sales representative in Texas, Mississippi, Louisiana and Arkansas. He will be under the general supervision of W. H. Appleton, southern sales manager, and will make his headquarters in Little Rock. Mr. Holloway is a graduate of the University of Arkansas, and for the past several years has been associated with Monsanto Chemical Corporation.

Holloway

John

William "Bill" John has been appointed as PCA's sales representative for portions of Missouri, Kentucky, Indiana and Illinois. He will reside in Effingham, Illinois, and will be under the general supervision of F. H. Kennedy, midwestern sales manager.

Mr. John is a graduate of the University of Missouri.

Cyanamid

The promotion of Dr. J. H. Ware to director of the product laboratory of the agricultural division of American Cyanamid Company has been announced by Dr. J. T. Thurston, manager of research and development for the division.

Effective immediately, Dr. Ware's new responsibilities will involve physical and chemical formulation studies of experimental chemicals and drugs for plant and animal use, and analytical procedures for proving the safety, effectiveness, and stability of all Agricultural Division products.

Dr. Ware joined American Cyanamid Company in 1955.

N. W. Nitro-Chemicals

R. W. Duncan has joined the sales staff of Northwest Nitro-Chemicals and will open new sales offices for the company in Portland, Ore.

Mr. Duncan was formerly manager of the Fertilizer Division of Pacific Supply Cooperative.

Spencer Chemical

Appointment of Brown Beasley as a senior market research analyst in Spencer Chemical Company's Agricultural Chemicals Market Research Department has been announced by B. W. Threadgill, department manager.

Beasley

Mr. Beasley has been associated with Spencer as an agronomist since 1952, devoting most of his time to fertility promotion work in the company's Mid-South District. During this time he was awarded honorary State Farmer Degrees by the state Future Farmer organizations of both Tennessee and Mississippi. In his new job, he will make his headquarters at Spencer's General Offices in Kansas City.

New territorial assignments involving seven men in Spencer Chemical Company's Agricultural Chemicals Division have been announced. According to general sales manager Ray White the general effect of the new assignments will be to concentrate greater sales effort in the states involved.

In the division's North-Central sales district, F. A. McGuire will become special accounts representative and his post as Illinois sales representative will be filled by Ned Haldeman. Mr. Haldeman has been the Spencer representative in Louisiana and Mississippi since 1956. Moving to the North-Central District as the representative for direct application solutions will be Paul Potterton, who joined Spencer this Summer.

Two states in the Northwest District have been divided and a salesman assigned to each territory. In Iowa, Coy Babb will be the Spencer representative in the western half of the state and Don Johnson in the eastern half. In Nebraska, Keith Carter will represent Spencer in the eastern half and Bill Smith in the western half. Mr. Babb has been in Iowa since 1956 and Mr. Carter in Nebraska since 1957. They were joined by Messrs. Johnson and Smith in 1959.

Pacific Guano

W. L. Dixon, Pacific Guano, has announced three appointments: Howard Conley, vice-president, sales; Jack Holinghead, v-p, purchasing and manufacturing; and Paul Weingart, treasurer.

PEOPLE...

IMC

Two promotions in the plant food division of International Minerals & Chemical Corporation have been announced by John Zigler, vice president.

Dick Lenz has been named sales supervisor of the Mason City, Iowa, district. George Donaldson has been appointed superintendent of the Fort Worth, Texas, fertilizer plant.

Mr. Lenz joined IMC three years ago. He will assist sales manager John Coates in handling sales activity and sales training programs for the Mason City District which includes Iowa and Minnesota.

Mr. Donaldson joined IMC in 1953. He has been assistant superintendent of the Ft. Worth plant since 1955 and has been acting superintendent there since the death of J. W. McElheney, Jr. earlier this year.

Dr. Allen T. Cole, Lakeland, Fla., minerals consultant, has been appointed property manager for the Florida and Tennessee phosphate operations of IMC.

He will be in charge of acquisition of land reserves utilization of properties prior to mining, and reclamation of mined-out areas.

Assisting Dr. Cole will be W. A. Stringfellow, reserves development engineer; A. J. Hahn, land reclamation engineer; and Cecil Stange, property superintendent. J. R. Hall will head the reserves acquisition program in the Tennessee field.

Southern Nitrogen

Southern Nitrogen Company has announced the promotion of John P. Porter from sales supervisor to director of sales - agricultural.

Porter

In his new position, Mr. Porter will continue to assist in selecting, training and supervising sales personnel in SONICO'S sales area and will work closely with the company's service groups, coordinating their efforts with sales. He will also be personally responsible for handling of many Southern's national accounts.

Mr. Porter entered the fertilizer industry with the F. S. Royster Guano Company 21 years ago, and worked as field representative in North and South Carolina, served as assistant manager for the Baltimore, Maryland division and in 1952 was promoted to sales manager of Royster's Georgia division, a position he held until joining Southern Nitrogen Company in 1956.

Griffin Fertilizer

Allen H. Hemenway has joined Griffin Fertilizer, Frostproof, Florida, replacing E. R. Johnston, resigned. The announcement by B. H. Griffin, Jr., president of the company, pointed out the long and varied experience which Mr. Hemenway enjoys.

Pacific Chemical

Louis Maurina has been moved from manager of the Kauai branch, to take over the Hilo branch of Pacific Chemical and Fertilizer, Hawaii. Mike Pederman succeeds him at Kauai.

Bemis

E. M. Proctor, manager of production for the western operations of Bemis Bro. Bag Co., since 1956, has been named assistant director of production for the entire company it was announced by Judson Bemis, president.

Mr. Proctor, who will move from the firm's western headquarters in San Mateo, California, to the general offices in St. Louis, joined the company in 1926.

Roberts

Williams

A. B. Williams, manager of sales for the Western operations of Bemis Bro. Bag Company, San Mateo, California, has been transferred to the St. Louis general sales department and G. N. Roberts, Jr., comptroller for Western operations, has been appointed West Coast representative for the St. Louis general sales department.

In making the announcement, H. V. Howes, vice president and director of sales, said Mr. Williams will assume responsibility for sales management methods, procedures and performance and sales training functions for the entire company. Mr. Roberts will handle sales pricing for Bemis operations west of The Rockies.

Mr. Williams joined the company in 1942, Mr. Roberts in 1939.

Chase Bag

W. L. "Bill" Yearsley has been placed in charge of the Denver sales office of the Chase Bag Company located in Room 302 of the Reynolds Building at 158 Fillmore Street. The telephone number is EAst 2-9608. He has been with the packaging firm since 1937, most of this time as its representative in Des Moines, Iowa.

Chase Bag has also announced promotion of John J. Bender to manager of its Paper Bag Division plant at Crossett, Arkansas. Mr. Bender joined Chase in 1951.

The plant manufactures bags for industrial and consumer applicatons.

NPFI

Louis H. Wilson, Secretary and Director of Information for the National Plant Food Institute, was reelected to the Board of Directors of the American Association of Agricultural College Editors at the annual conference.

Wilson

He will represent the associate members as a voting member of the board. At the annual convention, he served as chairman of the Association's resolutions committee and was appointed to the program committee for the 1961 meeting to be held in Washington, D. C.

Active members of the Association include the nation's Extension Service and Experiment Station editors.

Commercial Solvents

Dr. Carl F. Prutton has been elected to the board of Directors of Commercial Solvents Corporation. He is a director of Food Machinery and Chemical Corporation and a consultant for several chemical companies. Dr. Prutton retired last month as executive vice president, Chemical Divisions of Food Machinery and Chemical Corporation, was formerly vice president and director of Operations, Engineering and Research of Mathieson Chemical Corporation. Dr. Prutton at one time headed the Department of Chemistry and Chemical Engineering at Case Institute of Technology.

Also elected to the CSC board was Harry C. Hagerty, vice chairman of the board of the Metropolitan Life Insurance Company.

W. R. Grace

J. Peter Grace, president of W. R. Grace & Co., has announced that Osgood V. Tracy, formerly president

of Esso Standard, division of Humble Oil & Refining Company, affiliate of the Standard Oil Company (New Jersey), has ben elected a director and an executive vice president of W. R. Grace & Co. This appointment became effective September 1.

Mr Tracy will fill the post held by the late Marlin G. Geiger who died May 13, 1960. He will be in charge of the chemical business of Grace and will be responsible for the seven operating divisions as well as the Research Division comprising the Grace Chemical Group.

Mr. Tracy retired last month from Esso after a career in the oil and Chemical business which spanned more than 30 years.

Obituaries

George W. Shields, 71, who retired in January as vice-president and comptroller of Federal Chemical Co., Louisville, Ky., died August 1 at his home there.

James Spencer McHargue, 82, retired University of Kentucky research chemist, who was one of the poineers in research on the relation of minor elements to the health of plants and animals, died August 18 at Lexington, Ky., following a heart attack.

O-M Gets Safety Award

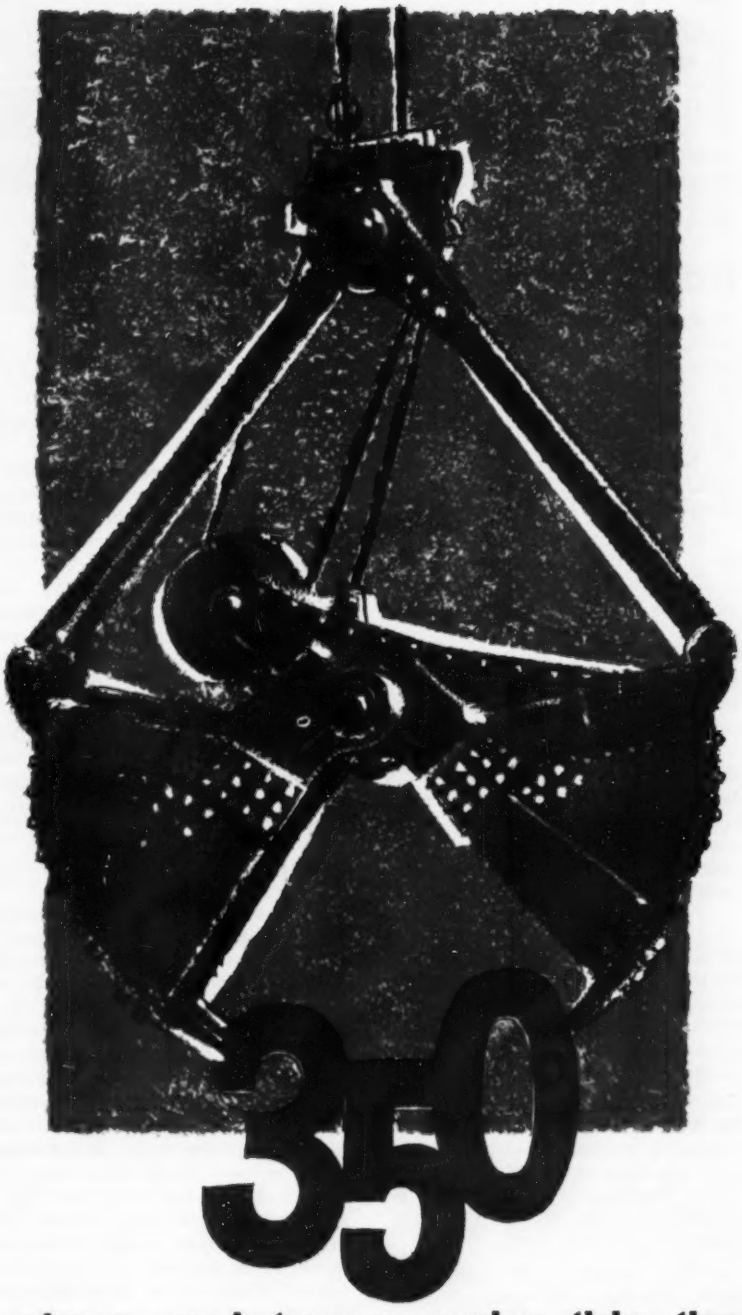
At a dinner meeting in North Little Rock, Arkansas, Saturday, August 6, a special safety award was presented to the operating personnel of the Olin Mathieson Sulfuric Acid plant. J. S. Gilliam, director of operations for Olin Mathieson, presented the award.

Mr. Gilliam pointed out that presentation of this award indicated the completion of 1,241 days of working without a single disabling accident. This achievement included 113,548 hours.

The Manufacturing Chemists' Association also presented a "Certificate of Achievement" for the North Little Rock Mathieson plant's 1959 safety record. This award was the third annual certificate received by this plant from the Association.

Henry T. Galt, plant manager for Mathieson in North Little Rock, received the awards in behalf of the personnel.

O-M has operated the North Little Rock plant since 1947.



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CALIFORNIA

Wilson & George Meyer & Co. will be exclusive sales agents for fertilizers made at the new plant being built at Dominguez by Stauffer, Shell and Western States. This plant will have more than 50,000 annual tons capacity and will round out a full line of fertilizers for the Western area.

FLORIDA

Virginia-Carolina's new facility at Nichols,—"the most modern concentrated superphosphate plant in the world," has been named for a man who has given all his adult life to our industry. He is Charles T. Harding, executive vice-president, 43 years ago a handyman in a North Carolina fertilizer plant.

On completion in December, the plant will turn out enough phosphoric acid to produce 300,000 annual tons of concentrated superphosphate. A diammonium phosphate plant, also under construction, will have a capacity of 100,000 annual tons. V-C say they have further expansion on the drawing boards.

The entire Nichols project, with the exception of the sulphuric acid facility, was designed, engineered and built by Wellman-Lord Engineering of Lakeland. The sulphur unit was designed by Monsanto and built by Leonard Construction.

• • •

Swift & Co. have announced plans for the construction of a new phosphoric acid plant at Bartow. The announcement was made by W. F. Price, general manager of their agricultural chemical division.

A contract for the construction of the plant, which will double the company's production of phosphoric acid, has been arranged with Dorr-Oliver Engineering. Construction is expected to begin in the Fall with completion in May, 1961.

Swift & Company has had phosphate mining operations in the Bartow and Fort Meade areas for a number of years and has a triple superphosphate plant in connection with its mining operations.

"These new facilities will enable us to substantially increase the production of triple superphosphate," Mr. Price said. "The plant will also make available liquid phosphoric acid for shipment to other centers.

• • •

American Cyanamid plans to double their production of wet-process phosphoric acid were announced last month by Dr. Wilbur G. Malcolm, president.

A multi-million dollar addition will be made at the company's Brewster plant to handle the increased production, Dr. Malcolm said.

With the planned addition, the Brewster plant will be capable of producing approximately 400,000 annual tons of wet-process 54% phosphoric acid.

"During the past 15 years," Dr. Malcolm said, "The use of fertilizer has tripled. We expect it to double or triple again within the next 25 years.

The new facilities will also provide an increased tonnage of triple superphosphate. This product and phosphoric acid will be marketed by Cyanamid's agricultural division.

ILLINOIS

US Industrial Chemicals has already increased the Tuscola plant ammonia production by 17% and anhydrous ammonia storage capacity will be expanded.

The new 6000 ton storage tank will use the relatively new principle of storing refrigerated ammonia at atmospheric pressure, rather than storing it in pressurized tanks at moderate temperatures. The storage vessel consists of an inner tank, 88 feet in diameter and 56 feet high, separated from an outer tank by 2½ feet of insulation. Liquid ammonia is stored in the tank at a temperature of about minus 28°F and this low temperature is maintained by evaporation of ammonia from the surface. The evaporated ammonia is then used as feed stock for the adjoining ammonium nitrate unit. It can also be recompressed and recirculated to the tank if necessary.

Paul J. LaMarche, U.S.I. director of production reports that the plant is already operating at the expanded rate of 70,000 tons per year (up from 60,000 tons) and a new 6000 ton storage facility is expected to be in full service by the end of the year.

KENTUCKY

F. S. Royster has offered to buy all outstanding stock of Price Chemical, a 41 year old fertilizer producer, founded by John A. Miller, now president, and the late W. N. Price. The company is said to have passed dividends and operated at a loss for two years.

NEW MEXICO

American Metal Climax will step up production of its subsidiary, Southwest Potash, Carlsbad. A $3,000,000 expansion, the second at Southwest since 1952, is in addition to plans for a $7,000,000 nitrate of potash plant at Vicksburg, Miss.

TEXAS

Phillips Chemical Company, wholly owned subsidiary of Phillips Petroleum Company, is constructing four 15,000-ton-capacity ammonia storage tanks, refrigerated to hold storage temperature at approximately —30 (minus 30) degrees F. at atmospheric pressure on the tanks. Two will be located at Cactus ammonia plant operated by Phillips near Etter, Texas, and two at the company's East St. Louis, Illinois, terminal on the Mississippi River.

These atmospheric pressure storage tanks will provide for more economical storage of anhydrous ammonia than conventional pressure tanks. They will enable Phillips to store large quantities of ammonia at key distributing points during the slack season in order to provide ammonia distributors with an adequate supply during the peak sales seasons. Construction is expected to be completed in time to fill the new tanks prior to the sales season next spring.

UTAH

Texas Gulf Sulphur, which has spent some $400,000 on preliminary development work in the Moab region, took over an option agree-

ment from Delhi-Taylor. They have asked that oil and gas prospecting be stopped on 25,000 surrounding acres.

As vice-president C. F. Fogarty puts it "The existence of commercial potash in Can Creek Anticline is a reality, while the existence of oil and gas in any part of the area is purely speculative.

The Governor has added his support to the plea, which is being considered by the U.S. Department of Interior. Such arrangements are usually on a ten year basis.

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Yuba Consolidated Industries, Inc., San Francisco, has purchased an estimated 120,000,000-ton phosphate deposit on the north side of the Uinta Mountains, about 12 miles from Flaming Gorge Dam.

Sellers were J. H. Morgan Sr., J. H. Morgan Jr., and Clarence I. Justheim. The sellers will retain a two-cents-a-ton royalty on beneficiated products, according to J. H. Morgan Jr.

The phosphate is only 43 miles by highway from the railhead of Green River, and when Flaming Gorge Dam is completed, the ore could be barged up the river to Green River.

WYOMING

Susquehanna-Western, Inc., Denver subsidiary of the Susquehanna Corp. of Chicago, has completed its second sulphuric acid manufacturing plant in Riverton, and production has started in the new facility.

This second plant doubles the firm's sulphuric acid production capacity. The new unit expands production capacity to 75,000 tons of acid per year.

Susquehanna's total investment in acid producing plants now exceeds $1,350,000, according to Allen D. Grey, Susquehanna-Western president. It is the only producer of sulphuric acid in Wyoming.

Susquehanna-Western began its sulphuric acid operations in December, 1958, when it completed its first Wyoming commercial plant, also located in Riverton.

The second plant was constructed in four months. It is fully automated and produces acid by burning pure sulphur obtained from Wyoming suppliers, who recover it from sour natural gas.

AFRICA

Uganda Development Corporation will make an initial investment of 400,000 pounds in a pilot operation toward setting up a fertiliser industry at Sugulu, near Tororo, a 25,000 annual ton operation.

ALGERIA

La Societe du Djebel Onk in conjunction with the French government in Algeria will construct a phosphate plant at Djebel Onk this year, for completion in 1962. The full plant is planned to be in operation two years later. Production schedules call for 50,000 tons during 1962; 600,000 in 1963; 800,000 tons in 1964. The whole cost is estimated at $26,500,000. The Djebel Onk phosphate reserves are reported to be the world's largest, containing between 500,000,000 and 1,000,000,000 tons.

BELGIUM

Societe Belge de l'Electrochemie, Ghent, whose chemical engineer has developed a process which is said to reduce the losses of calcium carbide from 10% to only 2%, is planning an expansion program. The process takes advantage of the heat liberated by the chemical process and with only 900 degrees centigrade applied, reaches 1100 degrees by auto-reaction. Under pressure this heat is raised six-fold, making a big saving in electricity—about 75% of former need. The plant to bring this process into practical application is due to be ready in 1961.

COLOMBIA

Colombia Fertilizer Co., now headed by Fernando Plata Uricochea, formerly president of the Bogota Stock Exchange. The firm currently is building a fertilizer plant in Barrancabermeja near a government oil refinery.

Work on the $8,500,000 fertilizer plant is 80 per cent completed but all machinery and equipment will not be installed and in operation before late 1961. Installation of the equipment will be directed by Italy's Montecatini, which will also serve as technical advisors during initial stages of production.

The company has received financial backing from numerous private concerns, including Bavaria Breweries, Coltejer Textiles and Colombiana Tobacco.

• • •

Compania Organizadora de Products Quimicos, Ltda., a new firm formed by International Petroleum, Ltd., Corporacion Financiera Colombiana de Desarrollo Industrial, and International Development & Investment Co., Ltd., plans a chemical fertilizer plant near Cartagena. The latter organization is formed by the Girdler Construction Division, Chemetron Corp.; the New York bank firm Dillon, Read, & Co.; and Thyson, a German business organization.

HINDUSTAN

Hindustan Chemicals and Fertilizers expect to be in operation with the Nangal plant toward the end of the year. Trombay is also progressing well, but is not expected on the line until 1963.

HUNGARY

Borsod Chemical Combine at Kazincbarcika, in northeast Hungary, the country's largest artificial fertilizer factory, this year is expected to produce 132,000 tons of nitrogenous fertilizer, 25 per cent more than had been originally planned.

Production costs at the plant are still above world levels, but short-term development plans are expected to remedy this. One way in which manufacturing costs will be cut next year will be by using natural gas, piped from Rumania, for fuel instead of coke as at present.

This year's scheduled investment of 131 million forints will be used mainly to enlarge installations which are too small to raise production to the planned level.

INDIA

Adarsh Chemicals & Fertilizers, Bombay, will build a plant for sulphuric acid production, scheduled to produce 50 daily tons of acid and 6 to 10 hourly tons of superphosphate.

• • •

Nangal Fertilizer and Heavy Water Factory is likely to be commissioned next January.

According to the original schedule, it was to go into production in April, 1960, but an accident last year upset arrangements regarding the supply of power with the result that the functioning of the factory was delayed by some months. Delay in the import of machinery was also responsible for it to a certain extent.

MOROCCO

Royal Dutch Shell and the government will enter into a joint 9,000,000,000 franc project at Safi, capable of 100,000 annual tons of ammonium phosphate, much of which will be exported—hence the location at Safi Harbor, which also has natural gas.

PAKISTAN

The West Bangal Government is negotiating with a Japanese consortium for a fertilizer plant at Durgapur, which would yield 200,000 annual tons of fertilizer. Completion is expected in about 3 years.

RUSSIA

Werkspoor, Holland, has agreed to build three urea plants in Russia, which are said to be the largest in the world.

FREE LITERATURE ON EQUIPMENT MATERIALS AND SUPPLIES

Poly-Ply Shipping Bags

A completely new line of moisture-resistant multiwall shipping sacks with a uniquely advantageous polyethylene - and - paper construction never before commercially available has been announced by the Chase Bag Company.

Named the Poly-Ply Multiwall, the bags feature a multiwall structure that includes a separate, intermediate ply (not a liner) of lightweight sheet polyethylene, spot-pasted at top and bottom to adjacent layers of heavy duty kraft paper. As a result, the polyethylene film is not next to the product. It is protected from abrasion and other mechanical injuries from the bag contents as well as from the outside.

The use of sheet polyethylene for this purpose instead of light poly-coated kraft gives superior moisture resistance. Handling and over-all strength are also found to be excellent.

Economically priced, the line is expected to find extensive usage in the packaging chemicals, fertilizers and other moisture-sensitive substances that are unaffected by contact with paper.

Standard sizes are 25, 50 and 100 pounds with either sewn-open-mouth or sewn-valve closure.

For further information, circle Number 1 on CF's Information Service card, page 47.

Three-Platform Truck Scale

A new three-platform Electronic Load Cell Truck Scale that determines the load carried by each axle and computes the gross vehicle weight, without moving the vehicle, is announced by Toledo Scale, Division of Toledo Scale Corporation.

Basically, this new scale has three platforms which may be constructed to any size requirement. However, for most truck scale applications one 24' x 10' and two 10' x 10' platforms are used, each supported on electronic load cells. These cells are connected to a single remotely located Toledo Electronic Scale head. A four-position platform selector switch is mounted on the scale head. This switch connects the cells under each platform in succession to the indicating head. Thus, the load of each axle is indicated and printed. The fourth position on the switch provides an indication of the total weight on the three platforms. A Toledo Printweight is provided, and this may be equipped with its accessories.

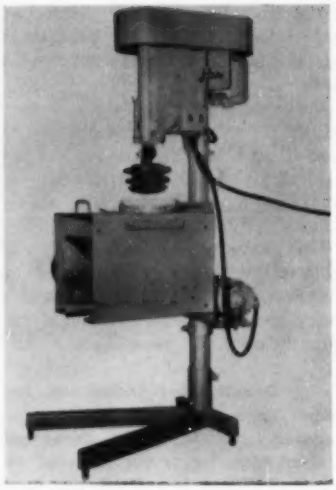
All four weight readings can be obtained in less than 30 seconds. The weight on each platform, as well as the sum indicated with accuracy of plus or minus .1 per cent.

For further information on Electronic Load Cell Truck Scales, circle Number 2 on CF's Information Service card, page 47.

Flexible Safety Goggle

Welsh Manufacturing Company is offering a new flexible frame safety goggle for dust and splash conditions. Its soft, flexible frame cushion-fits to face. All plastic vents—open louvered front and rear for dust conditions, and open louvered rear only for splash conditions—eliminate corrosion and electrical contact problems and provide greater ventillation and visibility. Available in clear or green frame with clear or green single lens.

For further information circle Number 3 on CF's Information Service card, page 47.



Mechanical Soil Pulverizer

With a new machine developed in the soils laboratory at the University of Wisconsin's College of Agriculture, samples of soil can be prepared for analysis in a minute or less. The invention accomplishes the job of deaggregating the soil to desired and uniform mesh sizes without crushing or 'powdering' the individual soil crystals.

Wisconsin soils authorities state that one operator can process more than 100 soil samples in a single hour with the specially developed power-driven machine. They point out that this kind of volume is from 6 to 8 times greater than an operator can produce by hand with the normally used mortar and pestle, and that soil samples prepared with the machine make it possible to obtain more accurate analytical results.

The Nasco-Asplin Soil Pulverizer is described as a mechanized mortar and pestle. It consists of a new type of finned pulverizing head which rotates at adjustable speeds. The head is lowered easily into a locked-in mortar to any desired level, depending on the amount and condition of the sample to be processed and the required fineness of the resulting particles.

The deaggregated soil is sifted through a screen which is kept in constant eccentric motion by means of a separate motor. The runoff through the screen is directed into a standard sample container.

Of special importance is the fact that the Asplin machine is designed to separate, or deaggregate, aggregations of soil particles. It does not grind them into a fine powder. Resulting chemical analysis, therefore, indicates the levels of nutrients which are available rather than total nutrient content. The latter reading is of little use to the farmer in evaluating his soil. pH determinations are also more accurate when the soil samples are deaggregated instead of being very finely ground.

The Foundation has licensed National Agricultural Supply Company to manufacture and distribute the invention. For detailed information, circle Number 4 on CF's Information Service card, page 47.

Bag Dumper

The dumping of bagged material is now made easy with the Cesco Bag Dumper made by Conveyors and Dumpers, Inc, Division of Mercury Industries. Bags of all types may be emptied . . . burlap, multiwall, open-mesh, cotton, polyethylene as well as other textiles and plastics.

Detailed information on all models is contained in Bulletin No. 100 available by circling Number 5 on CF's Information Service card, page 47.

Electronic Temperature Controls

United States Testing Company, Inc., has announced publication of a new bulletin describing their line of electronic temperature control equipment for the chemical processing industry.

These controls utilize bridge-connected thermistor probes with high gain electronic amplifiers to give control sensitivities from .0005° F. in a proportioning type to .001° .01°, 0.1°, and 0.4° F. in relay types.

Transistorized and vacuum tube relays for use with mercury thermo-regulators or other low current devices are also featured. These simplify the use and extend the life of thermo-regulators with heaters, motor controls, solenoid valves, or other circuit elements.

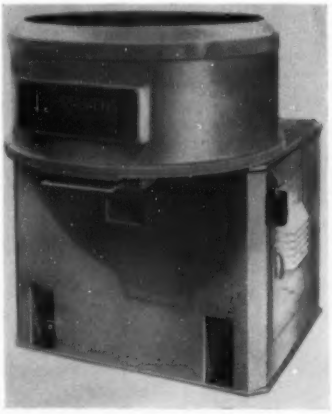
Copies of the bulletin describing the line of electronic temperature controls may be obtained by circling Number 6 on CF's Information Service card, page 47.

New Muller-Mixer

Frederic B. Stevens, Inc. has just introduced a new Stevens Muller, designed for batch mixing of fertilizers a wide variety of other dry and semi-dry products. It has a rated capacity of up to 400 pounds and in field testing has proved its ability to do a fast, economical and efficient job of mulling.

Outstanding features of the new Stevens Muller are: a low silhouette —it stands only four feet high and is extremely easy to load; compactness—occupies only seven square feet of floor space; speed—mixes a 400 pound load in less than 1 minute, discharges as fast as an operator can handle; ruggedness — solidly constructed of heavy duty materials for a long lifetime; maintenance freedom—simplicity of design eliminates maintenance problems.

For further information on this new Stevens product circle number 7 on CF's Information Service card, page 47.



Spreader Trucks

General Metals, Inc. are now manufacturing a line of bulk truck spreaders for the fertilizer industry, manufactured under a licensing agreement with the Even Spread Company. The power spreaders manufactured by General Metals will be identical in every respect to those made at Even Spread, and prices will also be the same, but GM will be able to give better and faster service to customers located in the Southeast and to keep up with the greater demand for this type of spreader.

Several patents held on the Even Spread Power Spreader have to do with the unique method used in spreading the fertilizer and lime material, using distributor tubes which give even, accurate spreading of the material over the entire area covered.

The spreader has a chain and slot conveyor in the bottom of the body, which is driven by the power take-off through a transmission, speed reducer and roller chain. An optional method of drive is off the wheels of the truck.

The distributor tubes can be easily connected or taken off by one person. They are placed on the side of the truck for road travel. Spring loading protects the tubes from damage in case of hitting obstructions.

For complete information, prices, etc., circle Number 8 on CF's Information Service card, page 47.

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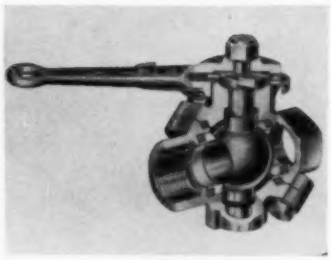

Ball Valves

The Valve Division of Besler Corporation now offer their field-proven ball valves to the general industrial market. These valves have been developed through nine years of abrasive use on agricultural equipment, and some 40,000 are in service.

Formerly known in different markets as 'Bes-Val' or 'Flo-Rul' valve, the name has been changed to 'Hi-Flo.' While previously manufactured only in ¾" and 1" sizes, valves from ⅜" to 2" have been added for the industrial market and 3", 4", 6" and 8" sizes will be available after the first of the year. Operating pressures extend to 1,000 P. S. I.

The valve offers no restriction to flow and creates no turbulence and no pressure drop. Dual seals are used, making the valve universal in installation, and it may be mounted in any position.

The Hi-Flow valve is stocked in bronze and aluminum; stainless steel and ductile iron versions may be obtained on order. Seats are of nylon, Kel-F®, and synthetic rubbers. Seals are of selected synthetic rubbers to meet specific requirements. Balls are hard chrome plated in the bronze and iron valves, and hard anodyzed in the aluminum valves.

Illustrated literature is available by circling Number 9 on CF's Information Service card, page 47.

Elevator, Conveyor Manual

Universal Hoist Company has announced publication of a new bound catalog and reference manual containing complete information on its bucket elevators and trough-belt conveyors, an all-inclusive reference publication including complete price, specification and dimensional data.

This guide for dealers, distributors, plant operators and project engineers is available by circling Number 10 on CF's Information Service card, page 47.

Phosphate Production Reprint

An article describing the installation of flotation and reactor plants at San Francisco Chemical Co.'s property at Leefe, Wyoming, originally published in 'Engineering and Mining Journal,' May, 1960, is offered as a free, six-page bulletin (Technical Reprint No. 7059) by Dorr-Oliver Incorporated The article describes production of high quality phosphate from low grade carbonaceous ore through flotation and through calcining in FluoSolids® reactors. Complete details of the process are given, as well as a flow sheet of the flotation and the reactor plants

For a free copy of Technical Reprint No. 7059, circle number 11 on CF's Information Service card, page 47.

Lime, Fertilizer Spreader Body

A three color brochure, offered by Baughman Manufacturing Company, details the information on their newest lime and fertilizer spreader bodies, the K-5 series.

Available in three different body styles and with a choice of four types of drives, each designed for a specific job, these bodies assure uniform distribution.

For a copy of Bulletin A-425AB, circle number 12 on CF's Information Service card, page 47.

Fork Truck Weighing Unit

A new catalog SS-1665 illustrates and describes the Model A-5 Baldwin-Clark weighing attachment for fork trucks available from Industrial Truck Division, Clark Equipment Company.

The electronic weighing attachment makes possible the in-transit weighing of loads by fork trucks and eliminates the need for weighing loads at platform scales. Load is weighed as it is picked up and weight is indicated on small console mounted on truck's instrument panel.

Model A-5 Baldwin-Clark weighing attachment can be installed on most gas and electric Clark fork trucks of 3000, 4000 and 5000-lb. capacities.

To obtain a copy of catalog SS-1665 on the Baldwin-Clark weighing attachment, circle number 13 on CF's Information Service card, page 47.

Material Level Control

Fail-safe operation is insured with a new electronic material-level control developed by Flo-Tronics, Inc. to determine the presence or absence of material at a desired level in a bin, hopper, storage tank or similar container.

Called the Model L-400 Flo-Level, this device can be used for material level surveillance and control or for quantity measurement in processing and storage containers. It is especially suited for use with powdery or granular products.

A rotating paddle in the container controls the generation of a small signal. A transistor circuit increases this signal and operates electrical contacts to control equipment or operate indicators to correct unsafe conditions.

The L-400 series includes standard and heavy-duty units, which are available with explosion-proof housings and stainless steel fittings.

For additional information circle number 14 on CF's Information Service card, page 47.

Multiwall Packaging Guide

A new 16-page 'Multiwall Packaging Guide' containing information on the basic types of multiwall bags, the principal types of multiwall bag closures, proper storage and handling of multiwall bags, railway car and truck trailer bag loading systems and multiwall packaging equipment is available at no cost from Bemis Bro. Bag Company.

For your copy, circle number 15 on CF's Information Service card, page 47.

Metering Pump Data

'Materials Selection Data' is the title of a new 4-page flyer now available from Clark-Cooper Company, Inc. It lists suggested construction materials for metering pumps handling various chemicals, and is available upon request.

This is a summarization of industry-wide information supplemented by Clark-Coopers' experience on many pump installations.

For your copy, circle Number 16 on CF's Information Service card, page 47.

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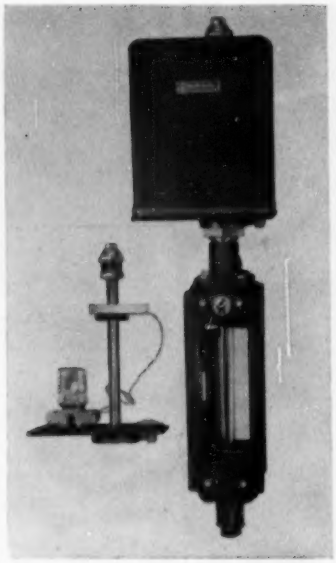


Magnetic Alarm Rotameter

A new line of Alarm Rotameters made by the Instrument Division of Schutte and Koerting Company is designed to measure fluid rate of flow and to indicate abnormal high or low flows.

They can be made to activate a warning light or alarm device, and will start or stop a pump, motor, or control unit. Their design and construction is simple making them economical and easy to maintain.

A typical unit consists of a standard 5 inch scale glass tube or metal tube Rotameter and a sensing system which is mounted above the Rotameter in a weather-proof extension housing. This type unit uses a float extension rod with an encapsulated magnet. The rod extends up into a stainless steel housing tube.

Either one or two sensing devices are set for maximum and/or minimum flows desired. Flows above or below these settings are considered abnormal. When flow is higher or lower than that for which the sensing devices have been set, the magnet in the extension rod will pass either the high or low sensing device.

The Magnetic Alarm Rotameters are illustrated and discussed in SK Bulletin 18A. Complete dimensional, sizes and capacity data are also presented. A copy of Bulletin 18A can be obtained by circling number 17 on CF's Information Service card, page 47.

Automatic Weighing Catalog

A new catalog on automatic weighing for all industries has just been published by Dynametrics Corporation, specialists in weight, force and pressure measurement and control.

The 16-page book, in two colors, contains many illustrations and informative diagrams, and concisely describes Dynametrics' Automattic Weighing Systems and Components. Particular emphasis is placed on the exclusive, highly-accurate Dynabatch Control System which uses a binary method for simplicity in remote weight setting.

Designed into the Dynabatch System are flexure pivots in three-point, non-redundant suspensions to prevent introduction into the system of unknown and unpredictable forces.

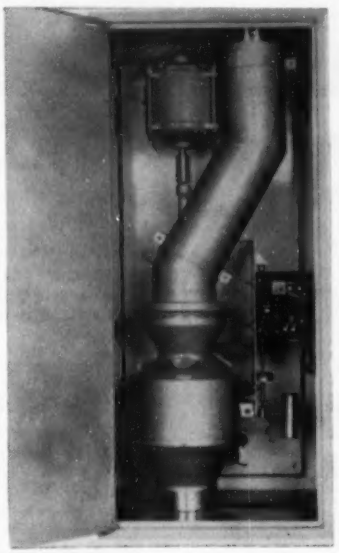
For Automatic Weighing Catalog No. 200, circle Number 18 on CF's Information Service card, page 47.

Dry Flow Meter

Industrial Processes, Inc. have developed and are marketing a new, low-cost precision device called the 'IPI' Dry-Flow Meter, an accurate method of weighing and metering a wide range of dry-flowing materials without interrupting flow.

Accuracy tests show variance confined to a maximum of 1%, plus or minus. The meter is not intended to substitute for beam scales, but rather to provide continuous, instantaneous or recallable stream-flow data and a low-cost approach to complete automation of dry-flow bulk processes.

The Dry-Flow Meter operates on an impact principle, translating unit weight of stream flow into electrical current via a new type of electronic transducer. Optional instruments (1) give direct readings in unit weight



per unit time from local or remote stations (2) make permanent recordings of flow for future study, or (3) totalize readings for any time period desired. Addition of a controller and volumetric feeder permits automated control of a dry-flowing material process.

The 'IPI' Dry-Flow Meter is relatively small, measuring about 46" high, 22" wide, and 16" deep, and can usually be installed in existing spouting systems during a normal downtime period. It is available in various sizes to meet varying requirements.

Detailed information can be obtained by circling number 19 on CF's Information Service card, page 47.

New Filter Valve

A new high-capacity valve design has been developed by Dorr-Oliver Incorporated, and adopted as a standard component for all their drum and disc filters.

The new valve design offers a completely streamlined flow for filtrate in single- and multiple-stage continuous filters. All internal obstructions have been eliminated. In field tests, a filter equipped with the new valve has shown liquid phase capacity 50% greater than similar filters equipped with conventional valves.

The new valve will be supplied at no increase in price on all single and dual solution applications of Dorr-Oliver continuous filters including Oliver® chemical and metallurgical filters, vacuum precoat filters, string discharge filters, and sludge dewatering filters; and American® Savealls and other disc filters.

For full information, circle number 20 on CF's Information Service card, page 47.

Soil Test Outfits

The Edwards Laboratory has prepared two new catalogs on Simplex Soil Test Outfits and other soil testing equipment.

One catalog, "Simplex Soil Test Outfits" describes and illustrates the Simplex Complete, Junior and Farm soil test outfits and Soiltex as well as a book on soil testing written by Dr. C. H. Spurway entitled 'Soil Fertility Diagnosis and Control.'

The other catalog "Simplex Soil Testing Accessories" lists 10 accessories ranging from soil thermometer to moisture meter.

Both catalogs are free and may be obtained by circling number 21 on CF's Information Service card, page 47.

Flame Analysis Accessory

High-volume output in flame analysis as many as 1000 measurements per day on a single instrument, now is possible with the new Autoflow Sample Handling System just introduced by Coleman Instruments, Inc. The system is an accessory for their Model 21 E Flame Photometer.

The new system reduced to a minimum the several steps ordinarily required in handling samples for flame analysis. Sample solution is introduced manually into an input funnel which feeds directly to the burner atomizer. On completion of the determination, a touch of the Autoflow button purges the sample chamber and readies the instrument for the next measurement.

For additional information, circle Number 22 on CF's Information Service card, page 47.

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Association Activities

Participants at the Montana Plant Food Association meeting in Boulder, Mont., standing, left to right, are: Dick Kube and Phil Donnley, Balfour Guthrie; Warren Stensland, Cominco Products; Bob Wahke and J. Killian, Farmers Union Central Exchange; Correy Dogstrom, Teslow, Inc.; Leonard De Jongh, Farmers Union Central Exchange; F. Todd Tremblay, Pacific Northwest Regional Director of the National Plant Food Institute; Seated: Bill Aldworth, Farmers Union Central Exchange; George Mason, Montana Flour Mills; Lyle Ekstrom and Homer Turner, J. R. Simplot Co.; Lyle Mills, Wilson & Geo. Meyer; Ross Hansen, Phillips Petroleum Co.; John, Latta, Spencer Chemical Co.; Lars Gallup, Whirry Soils Service; and Harold Ude, Farmers Union Central Exchange.

Wilson Named Manager Of Pacific Northwest Assn.

John Wilson took over last month as secretary-manager of the Pacific Northwest Plant Food Association, following the resignation of Leon S. Jackson, whose health forbids him to undertake the association work any longer. John Wilson has been for a long time the manager of the Washington State Feed Association, and brings to his new job a good familiarity with the aims and purposes of the Association.

Leon has remained with the organization long enough to make "Johnny" familiar with procedures and people, and will stand by as needed during the transition period. Headquarters of the Association are now at 814 Second Ave. Bldg., Seattle 4, Wash.

Regional Fertilizer Conferences Set — Northeast in Sept., Southeast in Oct.

Two regional conferences sponsored by National Plant Food Institute are coming up this month and next. The meeting in Pennsylvania, announced by NPFI's W. H. Garman, a two-day affair, comes this month and lists a good array of speakers. The other, in Atlanta in October, announced by NPFI's R. L. Beacher, is a one day meeting, preceded by a get-together the evening before. As the programs show, these meetings are geared carefully to the needs of the two regions involved. All members of the industry are invited to both meetings.

Northeastern Fertilizer Conference
Hotel Hershey, Hershey, Pennsylvania
September 29-30

THURSDAY, September 29

10:00 a.m.—Registration

1:30 p.m.—Welcome, **W. H. Garman**, National Plant Food Institute, Northeastern Regional Director.

"The Non-Farm Fertilizer Market in the Northeast."

"What Is the Market Potential," **C. R. Skogley**, University of Rhode Island.

"Fertilizer Practices in the Northeast."

"Intensively Used Turf," Dr. **J. C. Harper**, The Pennsylvania State University.

"Less Intensively Used Turf," **Joseph Troll**, University of Massachusetts.

"Highway Fertilization Practices in the Northeast."

"Establishment of Roadside Turf," **H. H. Iurka**, New York Department of Public Works.

"Maintenance of Roadside Turf," **E. F. Button**, Connecticut State Highway Department.

"Sales Promotion and Advertising."

"The Agronomic Approach to Sound Advertising," **C. F. Winchell**, Consolidated Rendering Co.

"Merchandising Techniques for the Non-Farm Market," **A. E. Buter**, Nitrogen Division, Allied Chemical Corp.

5:30 p.m.—Hospitality Hour

FRIDAY, September 30

9:30 a.m.—"Meeting the Challenge of the Next 10 Years."

"What Makes a Star Salesman a Star," **H. B. "Doc" Sharer**, U. S. Rubber Co.

"A Coordinated Marketing Program for the Plant Food Industry," **Dr. Hector Lazo**, Graduate School of Business Administration, New York University.

Question and Answer Period.

Fifth Southeastern Fertilizer Conference
Biltmore Hotel, Atlanta, Ga.
October 5-6

WEDNESDAY, October 5

6:30 - 8:00 p.m.—Hospitality Hour.

THURSDAY, October 6

9:30 a.m.—GENERAL SESSION; Theme: The Future For Farming and Fertilizer.

Welcome and Opening Remarks, **R. L. Beacher**, Director Southern Regional NPFI.

"What Does Agriculture Need?"—A Panel Discussion; William Campbell, Chairman, NPFI Southern Region Industry Advisory Committee, presiding.

9:40 a.m.—"Is it better public relations?", **L. Y. Ballentine**, North Carolina Commissioner of Agriculture.

10:05 a.m.—"Is it greater production efficiency?", **Dr. Earl L. Butz**, Dean, College of Agriculture, Purdue University.

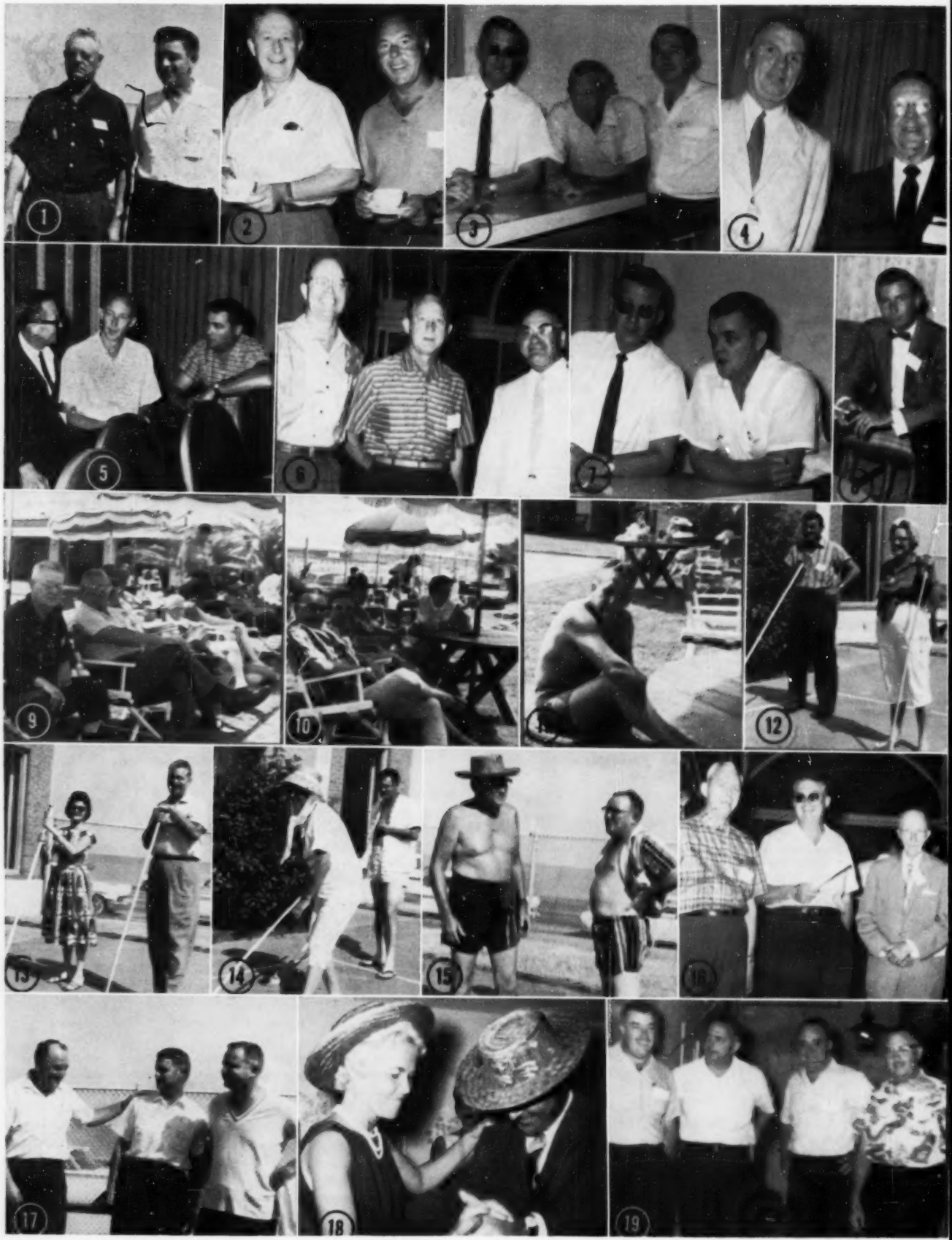
10:30 a.m.—"Is it better agricultural legislation?", **Donald R. Matthews**, Representative, Eighth District of Florida.

11:00 a.m.—"Is it a more intensive farmer educational program?", **W. A. Sutton**, Director, Georgia Agricultural Extension Service.

What Is Industry's Responsibility for the Future of Agriculture?

11:25 a.m.—**Dr. R. Q. Parks**, General Manager, Nitrogen Products Division, Grace Chemical Company.

NPFI Film: "Bread From Stone."



Southwest Fertilizer Conference Drew 260 to Galveston

The 1960 Southwestern Fertilizer Conference and Grade Hearing attracted over 260 industry representatives, college personnel, and Control Officials to the Galvez Hotel in Galveston, Texas, on July 27-30.

The Conference opened with a reception on Wednesday evening, followed by a general session on Thursday morning, the Annual Fertilizer Grade Hearing on Friday morning, and various recreational activities throughout the afternoons and evenings.

The general session was presided over by Stanley Hackett, chairman of the Southwestern Fertilizer Conference Committee. Dr. R. L. Beacher and W. R. Allstetter of the National Plant Food Institute opened the program with a discussion of NPFI activities both nationally and regionally. They introduced E. K. Chandler who will soon assume duties as Southwestern district representative in Shreveport for NPFI. Mr. Chandler has been located in Knoxville, Tennessee, representing the Institute in Tennessee, Alabama, and Mississippi.

Dr. M. B. Sturgis, Head of Department of Agronomy at LSU, outlined the importance of fertilizers to Louisiana agriculture. He pointed out that Louisiana had a deficit of over 31,000 tons of plant food nutrients in 1959, comparing tons of nutrients supplied with those removed by all crops and pastures. He said that fertilizer consumption in Louisiana would be increased almost threefold if harvested crop acreage was increased to a reasonable three and one-half million acres and farmers followed minimum fertilizer recommendations of the Louisiana Experiment Station.

C. B. Spencer of the Texas Cottonseed Crushers Association said that nearly one half of the six million acres of Texas cotton received no fertilizer last year. He noted that the opportunity for increased fertilizer use is greatest in the Blackland and in Central Texas, not in West Texas where fertilizer use already is near economic optima. Mr. Spencer outlined a new educational program directed to Texas cotton farmers and said that cotton growers who consistently make high yields of good quality cotton and also the most income are those who follow a proven route which includes adequate use of fertilizer. He added "we don't feel we have any possibility of getting our farm income on the right track without more fertilizer."

Dr. John E. Hutchinson, Director of the Texas Agricultural Extension Service, outlined progress of the

← Key to pictures

1. J. T. Carlisle, Jacksonville Fertilizer Co., and Joe Winderlin, Phillips Chemical Co.

2. "Dugan" Taylor, John Deere Chemical Co., and Dean Gidney, Potash Co. of America.

3. John Beatty, Jim Wilson, and Truitt Cook, of Olin Mathieson Chemical Co.

4. W. R. Allstetter, NPFI, and Stanley M. Hackett, Dixie Fertilizer Co.

5. Archie T. Edwards, Red Star Fertilizer Div.; A. L. McQuarry, Delta Fertilizer Co.; and Gene Morgan, American Cyanamid Co.

6. J. Q. Lynd, Oklahoma State University; Parks Yeats, Oklahoma Department of Agriculture; and M. B. Sturgis, Louisiana State University.

7. John Beatty, Olin Mathieson Chemical Co., and Bob Heck, International Minerals & Chemical Corp.

8. Clyde Tandy, Port Fertilizer and Chemical Co.

9. Jack T. Carlisle, Jacksonville Fertilizer Co., and Dr. Frank Fudge, Texas A. & M.

10. Mr. & Mrs. Jim Oates, Monsanto Chemical Co.

11. Woody Colvin, Ashcraft-Wilkinson Co.

12. Gene Morgan, American Cyanamid Co., and Mrs. Jack Carlisle.

13. Mrs. Roy Cook and Dave Seay, Phillips Chemical Co.

14. Mrs. Dave Seay and L. L. Jaquier, Phillips Chemical Co.

15. Bill Tyler, Longhorn Construction Co., and Jim Oates, Monsanto Chemical Co.

16. George Klein, Davison Chemical Division; Ken Winborn, Best Fertilizers Co., and Millard S. Perkins, Louisiana Department of Agriculture.

17. Harold Hoffman, International Minerals & Chemical Corp.; Arnold Neumann, Caprock Fertilizer; and Bud Horne, International Minerals & Chemical Corp.

18. Mr. & Mrs. Dick Taller, Longhorn Construction Co.

19. Damon Robinson, Kelly-Weber Co.; Bud Horne, and Harold Hoffman, both with International Minerals & Chemical Corp.; Voris King, Kelly-Weber Co.

1. Speakers C. B. Spencer, Texas Cottonseed Crushers Association; R. L. Beacher, NPFI; J. E. Hutchison, Texas Extension Service.

2. Chairman Stanley M. Hackett, Dixie Fertilizer Co., presenting award to Millard S. Perkins for 5 years service to Louisiana Department of Agriculture fertilizer division.

3. Mr. & Mrs. Sam Williamson and Mr. & Mrs. Jim Grosk, Coastal Chemical Corp.; Charles D. Goodale, Commercial Solvents Corp.; Bob Heck, International Minerals & Chemical Corp.; Mary Lindsey and Mrs. Jack Lindsey.

4. Roy Cook, Phillips Chemical Co., and Jack Carlisle, Jacksonville Fertilizer Co.

Texas intensified soil fertility program which started in the fall of 1959. He noted that the number of soil samples processed this year for the thirteen counties jumped 300% over the previous year. Economists will evaluate the adoption of improved practices at the end of this growing season. A new soil testing laboratory will soon be in operation at Lubbock to serve the West Texas area. Commenting on the potential income for the state, Mr. Hutchison said that use of better fertilizer practices would play as significant a role as anything he could think of. He said that Texas farm income could be increased by $250 million over the present $2½ billion through effective statewide intensified soil fertility programs.

Woody N. Miley, Arkansas Extension soil specialist, told how Arkansas' demonstration and intensified soil fertility program led to a boost in fertilizer consumption of 9% during 1959-60 in the five county intensified area. Consumption for the state as a whole climbed only 2.7%. Primary plant nutrient consumption soared 13% in the five counties, and 6% for the entire state. In Lawrence, one of the original intensified counties, soil samples more than doubled and total plant food use increased 40% since 1958.

Enoch T. Nix, vice president of the American Bank of Boosier City, Louisiana, told the Conference that the farmer who used fertilizer properly is a better credit risk. He said that loans for fertilizer usually are better for farmers than any other farm production item and these loans provide bankers with an opportunity to protect their investments. Applications for farm production loans should require a comprehensive management plan for the farm with anticipated costs and returns, and a well-planned soil fertility program.

The keynote speaker for the morning program was Ralph Everett, Director of Empire Sales Training Company in Miami. Mr. Everett emphasized that farmers should be sold on the basis of what feritlizer can do for them in terms of increased net profits, rather than on the basis of price alone.

Following the Thursday morning session, the ladies were entertained with a social and luncheon in the Galvez Hotel while the men took part in golf tournaments and recreational activities.

In the Friday morning session, fertilizer control officials and landgrant college representatives from Arkansas, Louisiana, New Mexico, Oklahoma, and Texas reported on the fertilizer grades approved for the coming year and consumption figures for the 1959-60 year to date. In Arkansas, total fertilizer consumption moved up to 362,000 tons in 1959-60 from 353,000 in 1958-59. Louisiana showed a 1% increase in total tonnage for the nine month period of September through May, and an 11% increase in use of approved fertilizer grades. Oklahoma's 1959-60 tonnage totalled 145,000 tons, compared to 133,000 last year.

A highlight of the annual dinnerdance was the impressive presentation of a plaque to Millard Perkins in recognition of his 65 years of service in the Louisiana Department of Agriculture. Mr. Perkins, who began to work for the Department in 1895, was presented the plaque by Stanley Hackett. Both Mr. Perkins and Mr. Hackett were the only conferees who had never missed an annual Southwestern Fertilizer Conference since it was initiated some 25 years ago.

The Conference will again be held in the Galvez Hotel next year on July 19, 20, and 21, 1961.

Soil Sampling Week Slated In Idaho

September 23-30 has been set as Intensified Soil Sampling Week in Fremont, Jefferson and Madison Counties, Idaho, according to F. Todd Tremblay, NPFI Northwest regional director. This will be the first phase of an Intensified Soil Fertility Program in the Tri-County area.

Plans for an Intensified Soil Fertility Program in the three counties were made at an Aug. 1 meeting in Idaho Falls.

Eventual goal of the program is a $5,650,000 increase in gross farm income which would require the use of an additional $1.5 million worth of fertilizer. Immediate goal is the taking of 2,400 soil samples, 800 from each county.

Dates Set For Illinois Fertilizer Clinics

Dates for four Seed and Fertilizer Clinics and seven Soil Testing and Fertilizer Clinics were announced last month by Dr. S. A. Aldrich, University of Illinois, at a meeting of National Plant Food Institute's Illinois Work Group at Urbana.

The Seed and Fertilizer clinics are slated for November 4 at Vandalia; November 15 at Macomb; November 16 at Dixon and November 17 at Urbana.

The Soil Testing and Fertilizer Clinics are scheduled for January 10 at Benton; January 11, Vandalia; January 12, Jacksonville; January 13, Galesburg; January 17, Urbana; January 18, Joliet; and January 19, Rockford.

Dr. Aldrich said the second series of meetings has been planned to report to dealers and farm advisors on changes in Illinois soil testing procedures and interpretations of soil tests which are being made in the state this year.

CFA Provides 2 Scholarships

Two new annual cash scholarships have been provided for deserving students in soils, crops, and related subjects, at Fresno State College and Chico State College, by the Soil Improvement Committee, California Fertilizer Association.

The scholarships, in the amount of $100.00 each, will be awarded annually, beginning with the 1960-61 school year, to one student at each of these colleges. Recipients will be chosen by the respective school Scholarship Committees on the basis of scholastic accomplishments and extra-curricular activity related to agriculture.

These two scholarships supplement four other annual cash scholarships, each in the amount of $100.00, which the Soil Improvement Committee has been awarding.

Industry Meeting Calendar

DATE	EVENT	LOCATION	CITY
Sept. 29-30	Northeast Fertilizer Conference	Hotel Hershey	Hershey, Pa.
Oct. 5-6	Southeast Fertilizer Conference	Biltmore Hotel	Atlanta, Ga.
Oct. 13-14	Fertilizer Control Officials	Shoreham Hotel	Washington, D. C.
Oct. 17-18	Fertilizer Industry Safety Section	Morrison Hotel	Chicago, Ill.
Nov. 2-4	Fertilizer Industry 'Round Table'	Mayflower Hotel	Washington, D. C.
Nov. 3-4	Pacific N.W. Plant Food Assn.		Boise, Idaho
Nov. 9-11	National Fertilizer Solutions Assn.	Peabody Hotel	Memphis, Tenn.
Nov. 13-15	California Fertilizer Association	del Coronado Hotel	Coronado, Calif.
	1961		
Jan. 11-13	Agricultural Ammonia Institute	Peabody Hotel	Memphis, Tenn.

Fertilizer Solutions Association Reveals Convention Plans

The 1960 annual convention of National Fertilizer Solutions association is scheduled for November 9-11, at the Peabody Hotel in Memphis, Tennessee, Executive Secretary Muriel F. Collie has announced.

Prominent speakers are scheduled for this meeting, with Earl C. Nightingale on "Management's Strangest Secret" highlighting the list. He is a man who at twelve years of age, living in poverty, determined to learn why some men succeed and others fail. He was determined that he not only would not fail, but would retire at an early age. He could have done this at age 35, having become independently wealthy, but instead he is in constant demand as a speaker helping others to learn "The Strangest Secret."

Industry speakers will cover many facets of products promotion. Robert C. Lemler of Aylco Corporation, Sullivan, Ill. will speak on "Selling the Farmer" F. E. Hartzler of Kansas State Teachers College on "Management Practices;" and a panel will review: Engineering Developments, Old and New; Water Soluble Phosphates, and Ten Years of Liquid Fertilizer. The men who will serve on this panel are: Morris T. Woosley, West Kentucky Liquid Fertilizer Co., Hopkinsville Ky.; Dr. John L. Strauss, Ris-Van, Inc., Belmond, Iowa; Dean R. McHard, Kaw Fertilizer Service, Lawrence, Kan.; and Demont Galbraith, Agriform of Northern California, Woodland, Calif.

Thirty exhibit conference rooms have already been reserved, with others being confirmed, making it possible for those in attendance to view and talk about new materials, new equipment, new processes and to learn all of the latest developments in the field, as well as some of the plans that are being made for the future.

At the opening session, in addition to association business, Roswell Garst of Coon Rapids, Iowa, will be a featured speaker on "The Farm Future."

The Convention will not be all business. There will be entertainment for the ladies; a banquet at which the 'Man of the Year' award will be made, and Sam D. Bundy of North Carolina will be the featured speaker; a good old southern cat fish fry is scheduled for the evening of November 10.

This convention is intended to serve as the drawing board for the plans of tomorrow to launch a program of growth.

Members of the convention planning committee are: John L. Wilson, chairman, Sangamon Grace Amonia Co.; Dean McHard, co-chairman, Kaw Fertilizer Service; Donald J. Humphrey, conference room chairman, Flo-lizer, Inc.; G. C. Mattheissen, Allied Chemical Corp.; and Edward A. Wex, Badgerland Liquid Fertilizer Corp.

President Hugh S. Surles, Jr., Planters Cotton Oil & Fertilizer Company, predicts that this will be the best convention National Fertilizers Solutions Association has had to date.

Association Activities

CFA Offers Range Fertilization Booklet

A 24 page booklet on Range Fertilization has been published by the California Fertilizer Association, and they announce they will be glad to mail single or multiple copies in reasonable numbers to all persons who address their requests to California Fertilizer Association, 719 K Street, Sacramento 14, California. This is the fourth printing of the well-written document since 1957.

VPI Plans Schools For Salesmen In October

Schools for fertilizer salesmen have been announced by VPI AES. One in Danville, Va., October 18-19; the other October 25-26 in Norfolk. During the next three years it is planned to hold such schools so that all areas of Virginia will be covered.

Fertilizer Control Officials Announce Oct. Program

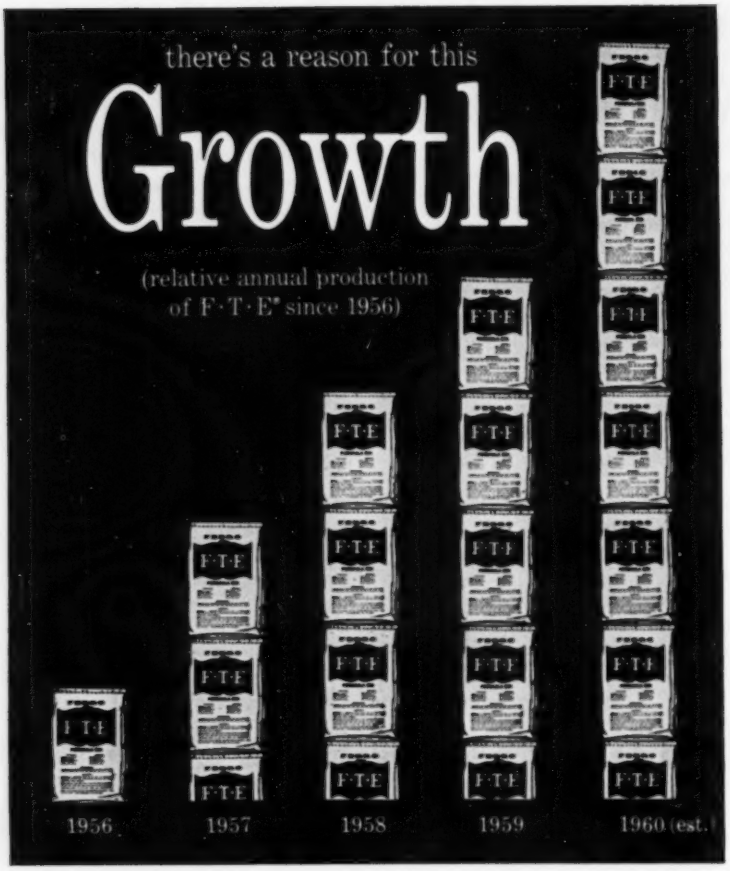
A meeting of exceptional factual content has been slated by the Association of American Fertilizer Control Officials on October 13-14 at the Shoreham Hotel, Washington, D. C. The speakers are outstanding and their subjects are well fitted to the planning for the current fertilizer season.

The reader will note the repeated appearance of the word "changing" in the program below, and may consider this a key to the type of meeting planned.

PROGRAM
Association of American Fertilizer Control Officials
October 13-14

THURSDAY Night, October 13
8:15 p.m.—Fertilizer States Relations.

FRIDAY, October 14
8:00 a.m.—Registration.
Reading of Minutes
Report of Secretary-Treasurer, **B. D. Cloaninger**, Clemson, S. C.
Announcements and Appointments of Committees.
Roll Call by States.
Presidential Address, **Dr. S. B. Randle**, New Brunswick, N. J.
"The Role of Fertilizer in a Changing Agriculture," **Dr. Chas. E. Kellogg**, USDA, Washington, D. C.
"Changes in Fertilizer Technology to Meet Agricultural Demands," **Dr. Rodger C. Smith**, Southern States Farmers' Exchange, Inc., West Springfield, Mass.
"The Role of Soil Testing in a Changing Fertilizer and Agricultural Program," **Dr. Ralph L. Wehunt**, TVA, Knoxville, Tenn.
12:30—Lunch.
Report on Survey on Bulk Distribution of Fertilizer, **Dr. Walter D. Scholl**, USDA, Beltsville, Md.
Preliminary Report of Non-Farm Use of Fertilizers, **A. H. Mehring**, USDA, Beltsville, Md.
Numerical Characterization of Fertilizer Company Records, **Dr. William Duncan**, University of Kentucky, Lexington, Kentucky.



Six trace elements, in fritted form, make FTE more productive, more predictable

It took years of development and testing to perfect FTE — to get just the right amounts and proportions of the six elements, and the proper degree of *controlled solubility*, for best results.

While *two* standard formulas are available, each developed to "work best" in specific areas of the country, both can be *safely used anywhere*, and *on any crops* . . . with assurance that the nutrients needed will be supplied all season.

While FTE may cost more per pound than more soluble products, its greater effectiveness permits you to use less of it in your mix for any desired results. That's why more and more companies are using it, and in more and more of their production.

Is FTE in *your* plans for next season? *It should be* . . . if only on a "let's try it" basis.

FERRO

FERRO CORPORATION

Agricultural Division

4150 East 56 Street • Cleveland 5, Ohio

Association Activities

Eight New Members Voted Into NPFI

Eight companies have been voted into membership in the National Plant Food Institute recently, president Paul T. Truitt has announced.

The addition of new members gives impetus to the Institute's program to expand the fertilizer market, Mr. Truitt said.

New members are as follows:

Central Resources Corporation, New York, New York; Crystal Chemical Company, Inc., South Sioux City, Nebraska; Goodpasture Grain & Milling Company, Inc., Brownfield, Texas; Kickapoo Valley Chemical Company, Atlanta, Ill.; Phinneys, Larned, Kansas; Plainsman Fertilizers, Inc., Plainview, Texas; and Tri State Fertilizer Company, Burlington, Iowa.

California Assn. Planning Third Western Handbook

The Soil Improvement Committee of the California Fertilizer Association has announced that it plans to distribute the revised Third Edition of the 'Western Fertilizer Handbook' in November

This issue will contain about 200 pages as compared with 168 in the First and Second Editions. It will have a 'new look' with a changed cover design in agricultural green and an extra title imprint on the left bound cover edge for reference convenience. With added charts and plates, also revised and new text, this new book is to be completely up-to-date in subject matter It will be an important reference tool to everyone working in agribusiness

Increased publication costs have made it necessary to change the former retail price from $1.00 to $1.50 per copy effective June 23, 1960.

First printed in 1953, with 15,000 copies, and reprinted in 1954 with 10,000 copies, this Handbook has had wide acceptance. It covers the subjects of western soils waters, fertilizer materials and fertilization problems written in terms understandable to the lay person.

Copies may be ordered on a prepaid basis from the California Fertilizer Association, 719 "K" Street, Sacramento 14, California.

The International Scene

AUSTRIA

Export specialty fertilizers

Austrian Nitrogen Works at Linz during the past season exported some 3000 tons of a new special fertilizer for horticulture and fruit-growing purposes. It is called Vollhumon and is a peat base product. Sales especially went to Northern Italy, but went also to Syria, Lebanon and Greece.

CEYLON

To conserve exchange

Fertilizer and other agricultural needs were exempted from a recent ruling by the Central Bank of Ceylon, the middle of last month, designed to conserve foreign exchange. Many commodities such as motor cars, cosmetics, cameras, alcoholic beverages were discouraged as imports by the ruling. Concessions were also given for financing the production of agricultural products.

CUBA

Bank controls fertilizer imports

According to the US Embassy in Havana, the Cuban Ministry of Commerce has designated the Government's Bank for Foreign Trade of Cuba as the sole importer of a long list of commodities including agricultural products, fertilizer and insecticides, tractors and other agricultural machinery.

GREAT BRITAIN

New regulations coming Oct. 1

New regulations, which will revise methods of analysis and certificates of analysis of fertilisers, will be promulgated by the standing advisory committee appointed under the Fertilisers and Feeding Stuffs Act of 1926. This act, basically, calls for written statements which are in effect a warranty of the source and the contents.

KOREA

1961 fertilizer plan drafted

The Reconstruction Ministry has drafted the country's fertilizer program for 1961. It estimates that $42,106,000 in ICA funds will be needed to help carry out the program.

Korea's total fertilizer requirements for 1961 are estimated at 1,413,000 tons, of which 889,000 tons would have to be imported through the U.S. aid program.

In addition, 40,000 tons of fertilizer are expected to be imported with part of proceeds from the forthcoming export of 30,000 tons of rice to Japan. The Chungju Fertilizer Plant, built with ICA aid, is expected to send 120,000 tons of urea into the domestic fertilizer market. To be added to this are the 368,000 tons to be carried forward from the current year—as an emergency stockpile.

Actual annual fertilizer consumption of this country, thus, is estimated at 999,000 tons, comprising 648,000 tons of nitrogenous fertilizer, 331,000 tons of phosphate, and 12,000 tons of potassium.

Our apologies to

American Agricultural Chemical Co.

Last month in this department we told how Cuba had taken over the Armour fertilizer plant at Matanzas, and the item described it as the "only Cuban branch plant at a U. S. fertilizer manufacturing firm" instead of "only Cuban branch plant of the U. S. fertilizer manufacturing firm," as we intended it to read. We discovered the error too late to catch it. But we do know, as our readers also know, that the American Agricultural Chemical Company owns a dry-mixing plant in Havana.

LEBANON

Seeking capital investment

Lebanon Chemicals Co. at Beirut wants to develop phosphate reserves said to total about 4,600,000 tons, and is looking for capital investment in the project.

PAKISTAN

Expects more foreign investment

A decision has now been taken by the Union Government on the fertilizer price policy in the Third Plan which should pave the way for substantial foreign investment in fertilizer production.

A "pool price" will be established from time to time and private sector fertilizer factories will be assured a price equal to that charged by the public sector for fertilizers of comparative quality, it is learned.

In other words, the competition between the private and public sectors will not be in terms of undercutting each other's prices, but of producing fertilizers at lower costs.

The Government's decision is being conveyed to the nearly 24 foreign companies which have expressed interest in fertilizer production in India.

But before making any firm commitment, these companies had asked for a clarification of the price policy the Government intended to pursue.

At present almost the entire fertilizer production of 300,000 tons in terms of nitrogen is in the public sector. Under the third Plan it is to be expanded threefold. Of the production target of one million tons, 800,000 tons are earmarked for the public sector, and 200,000 tons for the private sector.

Among the 25 companies which have expressed initial willingness to invest in India's fertilizer industry are several leading firms of the USA, a British consortium and some continental companies. A Japanese firm has already concluded arrangements for 49% partnership with the West Bengal Government in the Durgapur Fertilizer Factory. (See Around the Map, page 45).

Hikes Fertilizer Imports

Pakistan concluded deals last month with a number of foreign organizations for the purchase of large quantities of fertilisers in an attempt to boost food production in the country.

A Netherlands firm is committed to supply 30,000 metric tons of ammonium sulfate by the end of September.

An American firm has contracted to sell 62,000 tons of fertilizers, including 30,000 tons of ammonium sulphate and 20,000 tons of urea by mid-October. The whole of this will be utilized in East Pakistan.

Similar deals have been concluded with certain West German, Portuguese and other firms.

It is understood that these firms have agreed to accept price for the fertilisers in Pakistani rupee, which will be utilized towards purchase of raw jute for export to other countries.

International Scene

USSR

Chemical expansion rapid

The rapid industrial development of Eastern Siberia pre-supposes an expansion of agricultural production and the establishment of a large-scale fertilizer industry.

The prime cost of plants sufficient to make Eastern Siberia self-supporting in nitrogenous and phosphorous fertilizer is estimated at 4,000,000,000 roubles, which sum is expected to be reimbursed from the resultant increase in the first year's harvest.

YUGOSLAVIA

Seeks Engineering Aid

Engineering aid is desired by Tovarna Dusika Ruse of Yugoslavia, plus counsel in the construction of a plant to turn out 7,000 annual metric tons of elemental phosphorus and 25,000 annual metric tons of phosphoric acid.

Jute Market Conditions Improved

An official report from the secretary of Indian Jute Mills Association announced a further improvement in market conditions, a direct result of constructive action taken in the voluntary sealing of looms combined with more favorable prospects for the new jute crop.

IMC Slates Clinics On Production, Tech Service

A new series of fertilizer training clinics—this one featuring technical service and production problems—has been scheduled this fall by International Minerals & Chemical Corporation.

The clinics will follow the same pattern as the sales training clinics conducted by IMC last year as feature of its Full Orbit customer service program. Those two series of 10 meetings drew more than 800 fertilizer industry representatives.

Technical and production help has been high on the list of customer requests as a natural follow-up to sales training, according to IMC officials. The company's establishment of a full-time technical service staff last year made it possible to offer such training.

Equipped to handle the complete range of fertilizer manufacturing problems, rather than specializing in a single product, the staff is organized on a regional basis and has made more than 600 service calls since January.

The series of Production training meetings will open October 24-25 and conclude December 14-15.

Among subjects to be covered are fertilizer shrinkage, scrubbing and dust control, handling of liquids including all acids and nitrogen sources, sizing of raw materials, quality control, plant maintenance, specialty fertilizers, and supervision.

Richard G. Powell, IMC technical service manager, will take part in all 11 meetings. Neal Schenet, IMC manager of merchandising, will be moderator.

Technical service staff members from each region will be on hand for presentation of problems peculiar to their particular section of the country.

Meeting dates and sites are: Oct. 24-25, Minneapolis (Pick-Nicolett Hotel); Oct. 26-27, Indianapolis (Marott); Nov. 9-10, Baltimore (Lord Baltimore); Nov. 14-15, New York City (Park-Sheraton); Nov. 16-17, Raleigh, N. C. (Scandia Village); Nov. 21-22, Toledo, Ohio (Commodore Perry); Nov. 28-29, Winter Park, Florida (Langford); Nov. 30-Dec. 1, Montgomery, Alabama (Whitley); Dec. 5-6, Kansas City, Missouri (Muehlebach); Dec. 12-13, Tyler, Texas (Carlton); and Dec. 14-15, Jackson, Mississippi (Jacksonian).

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a farm indispensable...

that's why sales-minded dealers formulate with...

Triangle Brand Copper Sulfate

Triangle Brand Copper Sulfate is used

- *in fertilizers as a soil enricher*
- *in feeds as a dietary supplement*
- *in fungicides because it's compatible*

For information on formulating Triangle Brand Copper Sulfate into your farm products, write

Phelps Dodge Refining Corporation

300 PARK AVENUE, NEW YORK 22, N.Y.

NPFI Leaflet On Ammonium Nitrate

A leaflet on the recommended storage and handling of fertilizer grade ammonium nitrate has been published and is available from National Plant Food Institute, 1700 K Street, N.W., Washington 6, D. C. Single copies are free; bulk quantities are five cents a copy.

They point out in this folder that bagged goods must bear a yellow "do not drop" label as a precautionary measure, to avoid spillage though there is no danger in "dropping, hitting or pounding." With simple precautions, they continue, the material can be stored safely at the plant in warehouses or on the farm.

Procedure in case of fire is covered briefly, but very completely, with the assurance that there is no danger from explosion if explosives are not present and if the smoke and gases from the fire can escape freely.

Independent College Funds Elect O-M's Osborne

Stanley de J. Osborne, president and chief executive officer of the Olin Mathieson Chemical Corporation, has been elected a trustee-at-large of the board of the Independent College Funds of America, the national co-ordinating center and clearinghouse for forty state and regional associations representing 486 private accredited colleges located throughout the nation.

Mr. Osborne joined Mathieson Chemical Corporation in 1950 as treasurer and was then appointed financial vice president. With the formation of Olin Mathieson Chemical Corporation in 1954, he was named executive vice president in charge of the International division, and in 1956 he assumed the additional responsibilities of executive vice president for finance. He was elected president in May, 1957.

The 1960 Research on Parade Field Day of The Connecticut Agricultural Experiment Station held at Lockwood Farm in Mt. Carmel on August 10, came 50 years to the day after the first Station Field Day held in Hamden.

The Connecticut Agricultural Experiment Station, widely known for research on hybrid corn, is the oldest in America.

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MURIATE OF POTASH for the PLANT FOOD INDUSTRY

THIS symbol stands for high-grade uniform, coarse and granular Muriate of Potash (60% K_2O minimum). Southwest Potash Corporation provides a dependable supply of HIGH-K* Muriate for the plant food industry.

*Trade Mark

Southwest Potash Corporation

V-C NAMES PLANT FOR HARDING
Virginia-Carolina Chemical Corporation executive vice president **Charles T. Harding** (right), in whose honor V-C's expanded concentrated superphosphate plant in Florida was dedicated, (See Map), confers with Florida's governor-nominee, Farris Bryant (center), and V-C president Justin (Jet) Potter. Bryant was principal speaker at ceremony attended by 500.

Florida Ag Research

E. Meade Wilson, area manager in Mulberry, Florida, for the Plant Food Division of International Minerals & Chemical Corporation, recently was elected president of the Florida Agricultural Research Institute at the annual meeting in Fort Lauderdale.

FARI, organized in 1932, is a non-profit corporation operating in the fields of collection and dissemination of information concerning plant foods, agricultural pesticides, and related items. Mr. Wilson has been chairman of FARI's Industry and Public Relations Committee for several years.

HONORS

Controllers Institute

Keith B. Anderson, controller, Riverside Oil Mill, Marks, Miss., has been elected vice president of the Memphis Control of the Controllers Institute of America.

The new secretary of the Institute's Chicago Control is **Adrian H. Van Kampen,** controller-chemical industries, Armour & Co.

The Controllers Institute is a management organization of controllers and finance officers from all lines of business. The total membership exceeds 5,200.

VPI Makes VIP of Douglass

Ralph Benjamin Douglass, chairman of the board of the Smith-Douglass Company, Inc., in Norfolk, has received the highest accolade awarded by the VPI school of agriculture.

Mr. Douglass has been presented the 1960 Certificate of Merit, awarded annually to individuals judged to have made the most outstanding contributions to Virginia agriculture. He was nominated by staff members at VPI and approved by the Board of Visitors.

The presentation was made at the closing session of the Institute of Rural Affairs which has been in session here since Tuesday.

Mr. Douglass came to Virginia in 1920 as vice president of the Eastern Cotton Oil Company at Norfolk, serving there until 1927. That year he and Mr. Smith organized the present Smith-Douglass Company. He served as vice president from 1927 to 1950 and as president from 1950 to 1957, when he was made chairman of the board.

He was consultant as a dollar-a-year man to the War Production Board during World War II, was chairman of the organizing committee of the American Plant Food Council, Inc., Washington, and was one of the organizers of the Plant Food Institute of North Carolina and Virginia, serving as its president in 1945. In 1954, he was appointed by Governor Stanley as a member of the Commission on State Capital Outlays, and recently was appointed by Governor Almond to again serve on the commission. He was one of the organizers and a member of the Board of Directors of the National Plant Food Institute.

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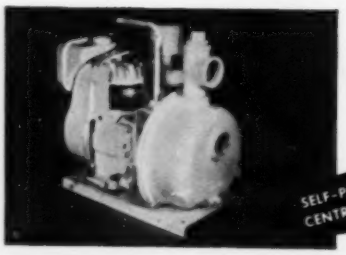
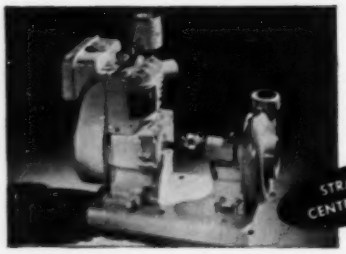
Presents a Complete New Line of

Dependable, Low Cost PUMPS



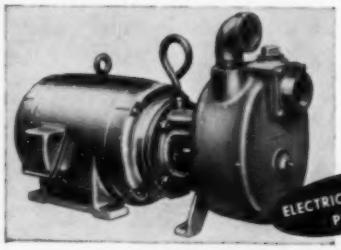
For Pumping of Liquid Fertilizer

These dependable, ruggedly constructed CROWN pumps are especially designed and engineered to assure you a low cost pump that will deliver under the most demanding conditions. In a Crown pump you get fast action, long life and low maintenance costs.



Check these CROWN PUMP features:

- Reliable Cast Iron Construction
- Corrosion-Resistant Iron Shaft Seals
- Replaceable Volute and Impeller
- Use Your Standard Crankshaft Engine



CROWN FIRST . . . newly designed pump that enables you to inexpensively replace the volute and impeller . . . takes only minutes, but saves you many dollars in upkeep. Available in highly resistant NI-RESIST IRON.

For Complete Details Write to

CROWN MANUFACTURING CO.
WATERLOO, IOWA

CHANGES

American Potash

William W. Young has been appointed Southern area regional sales manager for American Potash & Chemical Corporation, it was announced by Dr. A. J. Dirksen, general sales manager, Eastern.

Mr. Young, who will open the company's first regional headquarters at Atlanta in the near future,

Young

Morgan

will have sales and administrative responsibility for the Atlanta and Shreveport district offices.

Niven D. Morgan, Jr., formerly sales representative at Shreveport, replaces Young as district manager at that office.

C. L. Straughan continues as manager of the Atlanta district and will assist Mr. Young with regional matters.

Spencer Chemical

John C. Denton, president of Spencer Chemical Company, announced Aug. 5 a "redeployment of key personnel" involving top executives of the company. The moves, according to Mr. Denton, are designed to:

Concentrate efforts for diversification through acquisition and expansion; put greater emphasis on the company's program of foreign development; provide maximum executive emphasis on development and sale of the company's plastic products.

In carrying out these moves, Mr. Denton announced the following new assignments; Frank Pyle, formerly vice-president — plastics, has been named vice-president and assistant to the president. Mr. Pyle will have responsibility for Spencer's foreign activities, commercial development for diversification and the nuclear fuels program.

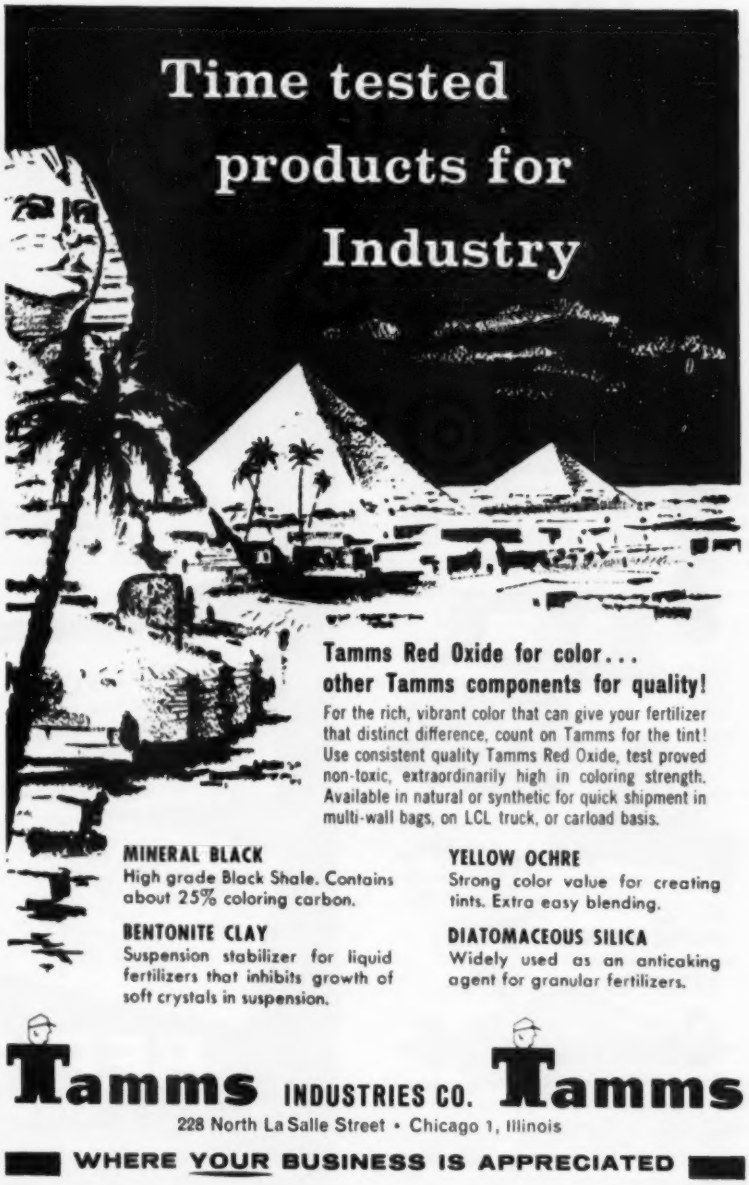
Harold Dinges, formerly vice-president—industrial chemicals, will become vice-president—plastics with responsibility for plastics sales and sales-related activities. E. V. Friedrich, vice-president—administration, will have the responsibility for overall direction of plastics division activities, including production and technical groups.

The company's Industrial Chemicals division will remain as a separate entity but will be under the direction of Byron Kern. Mr. Kern, who has been vice-president—agricultural chemicals, will now have the title of vice-president—agricultural and industrial chemicals.

Nordberg Manufacturing

To provide better service to users and prospective users of crushers, screens and process machinery, the establishment of office facilities in Dallas, Texas, the appointment of Eugene T. Daum as sales engineer in the new office and appointment of W. R. Neil Currie as sales engineer assigned to the St. Louis office were announced by J. B. Bond, manager of the mining, crusher and process machinery division, Nordberg Mfg. Co., Milwaukee, Wis.

In his new position Mr. Daum will headquarter at 143 Meadows Building, site of the Nordberg Engine Division office in Dallas, covering Texas, Oklahoma, New Mexico, Colorado and part of Western Kansas.


Time tested
products for
Industry
Tamms Red Oxide for color...
other Tamms components for quality!
For the rich, vibrant color that can give your fertilizer that distinct difference, count on Tamms for the tint! Use consistent quality Tamms Red Oxide, test proved non-toxic, extraordinarily high in coloring strength. Available in natural or synthetic for quick shipment in multi-wall bags, on LCL truck, or carload basis.
MINERAL BLACK
High grade Black Shale. Contains about 25% coloring carbon.
BENTONITE CLAY
Suspension stabilizer for liquid fertilizers that inhibits growth of soft crystals in suspension.
YELLOW OCHRE
Strong color value for creating tints. Extra easy blending.
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Widely used as an anticaking agent for granular fertilizers.
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Your nearby authorized Continental Conveyor Distributor can furnish the *right* equipment for *your* materials handling job — from stock, or from a nearby Continental Conveyor warehouse. Genuine Continental Conveyor components are backed by more than 127 years' experience in designing and manufacturing quality equipment for American industry.

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Call on your CONTINENTAL CONVEYOR MAN for help on materials handling problems.

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facts to help you sell

Soil testing is as much of a requirement for efficient farm mangement today as use of tractors, fertilizer, pesticides, milking machines or record books, says Dr. Richard B. Corey, Wisconsin soil specialist. It is the farmer's way of taking inventory of the plant nutrient reserves in his soil.

A leaflet entitled "How to take a soil sample" has been printed by Oklahoma State University. Written by Elmo W. Baumann, it is known as Leaflet L-5, in case you would like to have it for your salesmen and dealers.

Alfalfa movie, 25 minutes long, 16 millimeters wide—and in full color has been released by American Potash Institute, we learn from Dr. H. B. Mann, Institute president. It is for the use of agricultural college personnel, county agents, vo-ag teachers and others in agriculture and the industry. It was written and prepared by a group of authorities, led by Dr. E. T. York, now Alabama AES director.

Family farms of 1975, says USDA research Service, will be even more specialized than at present, but they will continue to dominate most types of farming. The average farm size will increase, and the total number of farms will decrease.

Following recommendations, an Alabama farmer jumped his cotton production from a 697 an acre to 1471 pounds on a test acre. On this acre he increased his fertilizer from 30-60-60 pounds to 112-60-60. The additional N cost him only $5.50.

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POTNIT®
Two plant foods in one
13% Nitrate Nitrogen
44% Potash (K_2O)

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An 85% magnesia which conditions your goods and supplies the necessary magnesium.

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REPRESENTATIVE WANTED in your territory. From your desk you can earn a substantial addition to your income. Only written contacts with your clients! Write for particulars and further details to VVK-Office, Vienna 66, P.O.B. 128, Austria.

POSITION WANTED

POSITION AS SUPERINTENDENT—30 years fertilizer experience, Granular, Pulverized, Superphosphate. Resume and reference on request. M. M. Ledbetter, 458 Stauring Ave., Columbus, Ohio.

TRAFFIC MANAGER of large industrial plant wishes to relocate in the fertilizer industry. Have 12 years experience in fertilizer plant superintendence, sales, maintenance, formulation etc. Very cost conscious. Experienced in class A plants, wet process phosphoric acid, triple super and sulphuric. Interested in challenging opportunity in South Atlantic area. Age 47. Box #10, c/o Commercial Fertilizer, 75 Third St. N. W., Atlanta 8, Ga.

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RATES: 50 cents a line for **Situations Wanted** ads; $1.00 a line for **Help Wanted** ads; $2.00 a line for all other classified advertising. Word count runs approximately eight words per line. Copy should be received by 15th of month preceding publication. **Display Classified Advertising** $15.00 an inch; minimum space one inch.

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FOR SALE: 20,000 gal., horizontal, aluminum storage tank. Working pressure—60 lbs. Used for Nitrogen Solution storage. Located in Ohio. Box #11, c/o Commercial Fertilizer, 75 Third St. N. W., Atlanta 8, Ga.

FOR SALE: Louisville 7' x 70' all welded rotary cooler. Davenport 8' x 60' welded rotary dryers. Allis-Chalmers 7' x 50' rotary cooler-dryer, ⅜" shell; Raymond 5-roller hi-side mill; Hardinge 7' x 36 stone lined conical mills. Sturtevant #9, 150 cu. ft. rotary batch blender, UNUSED. Perry Equipment Corp., 1426 N. 6th St., Philadelphia 22, Pa.

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CF Staff-Tabulated TONNAGE REPORTS

FERTILIZER TONNAGE REPORT (in equivalent short tons) Compiled by Cooperating State Control Officials and Tabulated by COMMERCIAL FERTILIZER Staff

	July		June		April-June Quarter		January-June		July-December		YEAR (July-June)	
STATE	**1960**	**1959**	**1960**	**1959**	**1960**	**1959**	**1960**	**1959**	**1959**	**1958**	**1959-60**	**1958-59**
Alabama	-------	23,905*	86,558	69,609	612,918	549,564	869,240	846,309	180,959	199,250	1,050,199	1,045,560
Arkansas	20,558	17,619	42,378	37,569	204,314	175,590	303,835	289,363	58,713	63,767	362,548	353,130
Georgia	83,684	80,725	226,167	231,074	947,423	955,705	1,102,220	1,130,998	299,194	294,751	1,401,414	1,425,749
Kentucky	-------	7,093*	43,505	26,415	319,164	307,715	456,676	491,920	108,734	99,460	565,410	591,380
Louisiana	-------	13,972*	29,603	21,173	150,438	122,382	224,087	201,642	66,744	64,152	290,821	265,794
Missouri	-------	23,095*	72,253	59,592	434,606	390,699	516,179	563,055	277,708	370,036	793,887	933,090
N. Carolina	-------	13,485*	113,740	95,713	988,133	842,771	1,381,263	1,468,704	175,533	228,055	1,556,796	1,695,759
Oklahoma	-------	6,567*	11,213	8,627	52,726	38,937	72,246	64,738	72,511	68,848	144,757	133,586
S. Carolina	11,122	12,632	53,388	47,518	411,739	370,628	678,986	756,100	104,903	134,202	783,889	890,302
Tennessee	17,626	15,644	45,157	28,621	353,905	292,705	480,429	443,602	117,275	127,116	607,727	570,718
Texas	34,355	36,002	92,452	66,121	281,701	228,767	474,627	441,851	233,410	222,800	708,037	664,651
California		(reports compiled quarterly)			-------	485,672*	-------	803,261*	465,495	459,735	-------	1,262,996*
Mississippi		(reports compiled quarterly)			-------	309,778*	-------	516,917*	142,576	176,371	-------	693,288*
Virginia		(reports compiled quarterly)			369,502	303,300	591,113	618,965	141,177	160,178	732,290	779,143
Indiana		(reports compiled semi-annually)					828,164	856,316	321,956	316,341	1,150,120	1,172,657
TOTAL	**167,345**	**162,622**	**816,404**	**692,032**	**5,126,569**	**4,578,863**	**7,979,065**	**8,736,618**	**2,766,888**	**2,985,062**	**10,147,893**	**10,522,319**

------- (not yet reported) * Omitted from column total to allow comparison with same period of current year.

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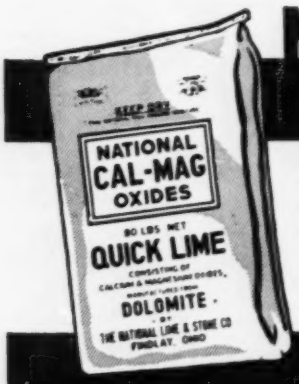

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